

Department of Commerce
U. S. COAST AND GEODETIC SURVEY
Washington

TIDAL BENCH MARKS

SAN FRANCISCO BAY REGION

T - 21 (Revised)

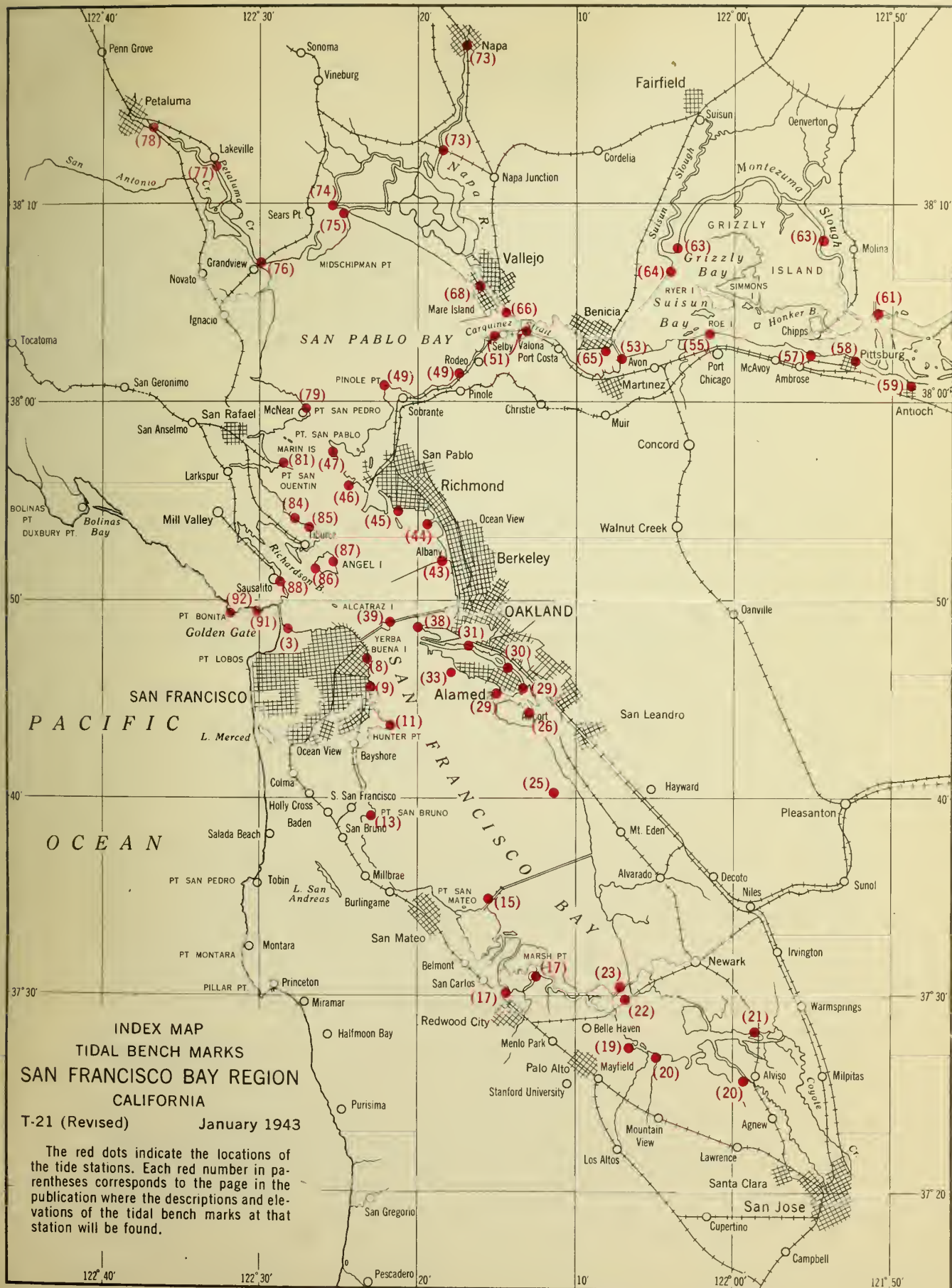
January, 1943



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DEPARTMENT OF COMMERCE
U. S. Coast and Geodetic Survey
Washington, D. C.



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TIDAL BENCH MARKS, SAN FRANCISCO BAY REGION

General Statement

The descriptions and elevations of tidal bench marks in this publication are based on the latest available data and supersede those given for the same area in mimeographed publication, T-21, "Tidal Bench Marks, San Francisco Bay Region", issued in May 1940. The descriptions and elevations of other tidal bench marks in the State of California have been published as follows: "Tidal Bench Marks, Los Angeles and Long Beach Harbor", April 1938; T-26, "Tidal Bench Marks, San Joaquin - Sacramento Delta Region", February 1941; T-30, "Tidal Bench Marks, California Coast", March 1942.

The datum in general use for hydrographic work along the Pacific Coast of the United States is mean lower low water (frequently abbreviated lower low water), which is the average height of the lower of the two low waters of each day over a considerable period of time. Unless the series of observations covers many years, corrections are applied to eliminate known variations and reduce the results to a mean value.

The elevation of each bench mark is referred directly to the datum of mean lower low water as determined from observations at a near-by tide station. The approximate geographic position of the tide station is given for each group of bench marks. The year of the establishment of each bench mark, when known, is given in parentheses. Following the descriptions of the bench marks at each station is a statement as to the length and date of the tidal series upon which the elevations depend and also a table giving the elevations of other tide planes referred to the mean lower low water datum.

In the above-mentioned table, the heights of the highest and lowest tides represent the probable extreme heights to be expected in each locality and are based on the latest information at hand at the time the table was being prepared. For subsequent or more detailed information relative to extreme heights, inquiry should be made of this Bureau, which for its primary tide stations keeps on file a compilation of the dates and heights of the highest and lowest tides recorded each month.

Mean higher high water (frequently abbreviated higher high water) is the average height of the higher of the two high waters of each day over a considerable period of time.

Mean high water is the average height of all high waters in any locality over a considerable time.

TIDAL BENCH MARKS, SAN FRANCISCO BAY REGION

General Statement (cont'd.)

Half tide level, also called mean tide level, is a plane midway between mean high water and mean low water. On the open coast this plane approximates the mean sea level.

The Sea-level Datum of 1929 is the datum that has been adopted for the precise level net of the United States and is based on mean sea level at certain selected tide stations. Mean sea level is the average height of the surface of the sea for all stages of the tide as observed on the open coast and is usually determined from hourly height readings.

Mean low water is the average height of all low waters in any locality over a considerable period of time. This plane is used as the datum for hydrographic work on the Atlantic Coast of the United States.

This publication includes only bench marks in the vicinity of tide stations. For information in regard to other bench marks in California which have been connected with the level net of the United States and which are referred to the sea-level datum, application should be made to the Director, U.S. Coast and Geodetic Survey, Washington, D. C.

Although a bench mark may appear to be quite permanent in character, the elevation may have changed, due to settling or from other causes. Engineers are, therefore, cautioned to connect with two or more bench marks whenever possible.

It will be appreciated if anyone recovering bench marks that are inadequately described, or appear to have changed elevation will report the same to the Director, U. S. Coast and Geodetic Survey, Washington, D. C. Such a report will not only be a service to this Bureau but to all engineers and surveyors who may have occasion to do leveling in the locality in the future.

TIDAL BENCH MARKS

Presidio, San Francisco
Lat: 37°48' Long: 122°28'

BENCH MARK 165, at the northeast end of Crissy Field, is the top horizontal tangent of a $3/4$ -inch copper bolt $3\frac{1}{2}$ inches long and projecting about $\frac{1}{2}$ inch from the wall, placed in a horizontal hole drilled in the east face of a cement abutment wall which forms the approach of the Presidio Wharf. The bench mark is 1.17 feet lower than the top of the abutment wall and 25.37 feet southward from where the wall hits the wharf. The end of the bolt is stamped "U.S.C.S.". Elevation: 10.31 feet above mean lower low water.

BENCH MARK 166, at the northeast end of Crissy Field, is the top of a $3/4$ -inch brass bolt 4 inches long, stamped "U.S.C.S.", placed in a vertical hole drilled in the top surface of the cement abutment wall which forms the approach of the Presidio Wharf. The bench mark is 0.49 foot west of the east side of the wall and just above Bench Mark 165. Elevation: 11.50 feet above mean lower low water.

BENCH MARK 167^a is the top of the rounded head of a 2-inch copper bolt set in the top of a granite post which is 12 inches by 12 inches by 36 inches. The top of the post has the following inscription cut into the granite: "U.S.C.S. 1897 B.M.". The bench mark is on a granite post formerly used for Bench Mark 15 and also for Bench Mark 167, but which was moved by the military authorities to a new location about October 1936 when Crissy Aviation Field was being improved. The bench mark is now located on the northerly side of Marina Drive at the easterly side of an intersection with a road leading to dock. It is set back from both roads about 5 feet and is about 100 feet south of the high water line. The bench mark is 147 feet south of the shore end of Presidio Wharf, 19 feet east of the center line of the road leading to the wharf, 17 feet north of the center line of Marina Drive and about one foot above the surface of the road. Note: It was reported in October 1942 that this bench mark is now in a truck parking area. The mark is leaning and has fresh scars as if hit by trucks. Elevation: 12.50 feet above mean lower low water.

BENCH MARK 173 (1925) is a standard disk, stamped "BM 173 1925", set in a concrete block in the southeast corner of the yard of the United States Coast Guard Station (Fort Point Station), about 65 feet southeast of the southeast corner of the Crew's Quarters Building, and about 5 feet north of the north edge of Marina Drive. The bench mark is inside the southeast corner of the evergreen hedge (about 7 feet high) bordering the yard of the Coast Guard Building and was 1 inch below the surface of the ground (in September 1942). Elevation: 10.25 feet above mean lower low water.

TIDAL BENCH MARKS

Presidio, San Francisco (cont'd.)

BENCH MARK 174 (1925) is a standard disk, stamped "B.M. 174 1925", set in the center of a six-foot granite paving block about 125 feet west of the west prolongation of the Engineers Dock (Torpedo Dock) where it crosses Marina Drive, inside of a "Y" between Marina Drive and the road leading up the hill to Fort Winfield Scott from in front of the Engineers Dock. It is located about 50 feet westerly from a fire plug. Elevation: 16.94 feet above mean lower low water.

BENCH MARK 175 (1925) is a standard disk, stamped "B.M. 175 1925", set in the top surface of the sea wall about $2\frac{1}{2}$ feet south of the north edge of the wall, about 365 feet west of the west line of the Engineers Dock where it crosses Marina Drive, about 270 feet west of Bench Mark 174, 38.1 feet west of the northwest corner post of a woven wire steel fence around the Engineers Supply Yard, at the sea wall line, and on the north side of Marina Drive between the Engineers Dock and Fort Point. Elevation: 14.63 feet above mean lower low water.

BENCH MARK 176 (1925) is a standard disk, stamped "B.M. 176 1925", set flush with the surface of the concrete step on the west side of the lowest step to the main entrance of the porch of Presidio Infantry Headquarters Building on Mason Avenue and about 8 inches above the level of the sidewalk around the building. Elevation: 16.18 feet above mean lower low water.

BENCH MARK 179 (1936) is a standard disk, stamped "179 1936", located at the northwest corner of concrete pavement of Hallock Street at Vallejo Street and 25 feet north of the northerly approach to the Golden Gate Bridge (nearest concrete column). Note: It was reported in September 1942 that the bench mark is not countersunk; is run over by trucks and cars and probably will come loose at any time. Elevation: 10.38 feet above mean lower low water.

BENCH MARK 180 (1936) is a standard disk, stamped "180 1936", located at the northwest end of Crissy Field on the property of the United States Coast Guard Station. It is set on top of a concrete sea wall, $4\frac{1}{2}$ feet north of an angle in the wall, 50.3 feet southeast of the northeast corner of the Crews Quarters building and on line with the northern face of the building and 97 feet northeast of Bench Mark 173. Elevation: 13.46 feet above mean lower low water.

TIDAL BENCH MARKS

Presidio, San Francisco (cont'd.)

TRIANGULATION STATION WEST BASE (1932) is a standard triangulation station disk, stamped "WEST BASE 1932", set in a concrete post, flush with the ground level, at about the center of the north side of Crissy Field, about 550 yards east of the United States Coast Guard dock, 198 feet east by south of a point on retaining wall over line of an 18-inch cast-iron drain pipe, 28 feet south of near edge of wooden retaining wall, in line with the south edge of Marina Drive, 36.3 feet southeast of reference mark No. 1 to triangulation station WEST BASE, 35.8 feet southwest of reference mark No. 2 to triangulation station WEST BASE and about 8 inches under the surface of the aviation field. Elevation: 9.70 feet above mean lower low water.

BENCH MARK Reference Mark No. 1 WEST BASE (1932) is a standard reference mark, stamped "WEST BASE No. 1 1932", set in a concrete post about 1 foot below the ground level, located 36.3 feet northwest of the triangulation station and 46.7 feet west of reference mark No. 2. It is in the Presidio, at about the center of the north side of Crissy Field, about 550 yards east of the United States Coast Guard dock, about 197 feet west of a reverse curve in Marine Drive, 172 feet east (along retaining wall) of an 18-inch cast-iron drain pipe, 3 feet northeast of a boundary marker for the landing field, 14 feet north of the center line of Marina Drive and $1\frac{1}{2}$ feet south of the wooden retaining wall. Elevation: 10.04 feet above mean lower low water.

BENCH MARK Reference Mark No. 2 WEST BASE (1932) is a standard reference mark, stamped "WEST BASE No. 2 1932", set in a concrete post 4 inches high, located in the Presidio, along the north side of Crissy Field, 46.7 feet easterly from reference mark No. 1. It is 14 feet north of the center line of Marina Drive and one foot south of the wooden retaining wall. Notes: It was reported in September 1942 that the wooden retaining wall is broken at this point and the dirt has washed out around this mark so that $1\frac{1}{2}$ feet are exposed and the mark is not secure. It will probably wash out soon. Elevation: 10.61 feet above mean lower low water.

BENCH MARK "USED", established by the United States Engineers, is a cross cut on the top of a brass plug imbedded in a concrete cylindrical post, 8 inches in diameter, set 4 inches below the present (1942) ground level, located on the southwest side of Marina Drive in front of the Coast Guard Station (Fort Point Station), 119 feet west of Bench Mark 173, 9.2 feet northwest of the prolongation of the northwest face of the Crew's Quarters building, 42 feet southwest of the center of the hedge bordering the Coast Guard grounds and 12 feet southwest of the southwest side of Marina Drive. Elevation: 9.95 feet above mean lower low water.

TIDAL BENCH MARKS

Presidio, San Francisco (cont'd.)

BASIC BENCH MARK (1932) is a standard disk, stamped "X 108 1932 63.222", set in the top of a concrete monument 1.55 feet square and projecting 1.8 feet above the ground, located at San Francisco Civic Center in front of California State Building near the main entrance on McAllister Street side, between Polk and Larkin Streets. Elevation: 66.27 feet above mean lower low water.

BENCH MARK R 108 (1932) is a standard disk, stamped "R 108 1932", set in a small black boulder on a hillside located at Fort Point in the Presidio, about 200 yards southeast of the old fort, about 235 feet southeast of the point where the sea wall turns to run toward the point, 90 feet south of the sea wall, 22 feet above the surface of the road, about 20 feet (inclined distance) southeast of Bench Mark 64 along line from north bridge tower and large boulder on beach, near the east side of a barren spot on the hillside. Elevation: 40.65 feet above mean lower low water.

BENCH MARK 64 (1907) is a $\frac{1}{2}$ -inch copper bolt, unstamped, set in cement on the highest point of a dark gray boulder which is 10 feet long and 5 feet high on the lower side, located at Fort Point in the Presidio, about 200 yards southeast of the old fort, about 230 feet southeast of angle in sea wall where it turns to run toward point, about 75 feet south of sea wall, about 13 feet above surface of road, 3 feet north of path leading uphill and in line with a large boulder about 50 feet north of sea wall and north bridge tower. Note: Levels run in 1925 and 1939 indicate that this bench mark has settled about 0.15 foot during this period of time. Its elevation is, therefore, derived from the 1939 line of levels. Elevation: 30.97 feet above mean lower low water.

BENCH MARK S 108 (1932) is a standard disk, stamped "S 108 1932", set in the top of a retaining wall and 5 feet above the concrete walk that follows along the base of the retaining wall up to the top of the hill at Fort Point, in the Presidio, about 365 feet south of the southeast corner of the old brick fort on Fort Point. The bench mark is 28.7 feet north from the south end of the 5-foot concrete retaining wall. Elevation: 40.85 feet above mean lower low water.

BENCH MARK 6 (1892) is a copper bolt set with its head about $\frac{1}{4}$ inch below the upper surface of the granite sea wall surrounding Fort Point, at the angle where the wall changes abruptly to run toward the point and about 0.5 foot from the shore edge of the wall. The head of the bolt has a slightly rounded face $1\frac{1}{2}$ inches in diameter, with a small silver pin in its center. The top of the silver pin is the reference mark. The bench mark is about 375 feet S23°E of the southeast corner of the old brick fort. Elevation: 15.89 feet above mean lower low water.

TIDAL BENCH MARKS

Presidio, San Francisco (cont'd.)

BENCH MARK 9 (1892) is the center of a brass plate set in the concrete of emplacement No. 12 on top of parapet of Marcus Miller Battery at Fort Point. The top of this plate is $1\frac{3}{4}$ inches square; and the base is a little over 3 inches square, the sides being corrugated horizontally to hold the cement in which it is set. The following is stamped in the brass plate: "U.S.C. & G.S. 'Mendel' 1892 B.M. 202.261", (the figures indicating its elevation above the plane of mean lower low water at that time). The top of this emplacement has been built up about $2\frac{1}{2}$ feet, but a well has been left around the bench mark, and an iron plate about 15 by 18 inches covers the top. Elevation: 202.41 feet above mean lower low water.

BENCH MARK 63 (1907) is a 3-inch circle circumscribing a triangle, drilled upon the top at its center, located on a granite monument 3 feet long, 17 inches wide and 8 inches above the ground and alongside the road leading to the engineer's quarters. The bench mark is 67 paces west of a large brick culvert. Directly across the road to the northward and 15 feet away is a large eucalyptus tree in which, facing the monument, are driven three large nails in the form of a triangle with a 3-inch base, the nails standing out about $\frac{1}{2}$ inch. On the opposite (north) side of the tree, only 6 inches above the ground, is an old blaze with nail driven to head. This bench mark is located a few hundred feet west and above the Crissy Field airplane hangars. Note: It was reported in September 1942 that this general area has changed considerably. The bench mark could not be found and is believed gone. Elevation: 85.60 feet above mean lower low water.

BENCH MARK T 108 (1932) is a standard disk, stamped "T 108 1932", located at the Presidio in the concrete floor of the gun placement at Fort Point, 110 feet north of the center of the Marcus Miller Battery, at the top of the steps at the north end of the floor, $6\frac{1}{2}$ feet below the top of the parapet and at the south end of an iron handrail. Elevation: 187.93 feet above mean lower low water.

The lower low water datum at Presidio, based on miscellaneous observations prior to 1907, was adopted as standard in March 1907, having been in general use for a number of years prior to that date. The elevations of other tide planes referred to this datum are based on 19 years of automatic tide gage records, 1914-1932, and are as follows:

TIDAL BENCH MARKS

Presidio, San Francisco (cont'd.)

Highest tide (December 24, 1940)...	8.25
Higher high water	5.66
Mean high water	5.08
Half tide level	3.10
Sea-level datum of 1929	3.05
Mean low water	1.13
Lower low water datum	0.00
Lowest tide (December 26, 1932 and December 17, 1933) ...	-2.45

Rincon Point, San Francisco
Lat: 37°47'.4 Long: 122°23'.2

BENCH MARK 44 (1889) is the top of a granite post set into the wall of a brick warehouse at No. 224 Folsom Street, between Main and Beale Streets. In 1927 this building was known as Sunset Terminal. The granite post is on the west side of the doorway and is set into the wall to prevent wagons from striking the wall. A similar post is on the other side of the doorway. Elevation: 21.06 feet above mean lower low water.

BENCH MARK 153, designated No. 559 by the City Engineer, is a triangle cut on a cement walk at the north corner of a large brick building (J. A. Folger & Company), located at Howard and Speare Streets. It is on the Howard Street side and 6 inches from the corner. Elevation: 12.35 feet above mean lower low water.

BENCH MARK 158, designated No. 593 by the City Engineer, is a cross cut on a concrete sill just to the left of the entrance at Nos. 151-155 Main Street. It is 6 inches above the walk and 17 inches from the northwest end of the sill. The bench mark is on the northeast side of Main Street and 270 feet northwest of Howard Street. Elevation: 12.49 feet above mean lower low water.

BENCH MARK 179 (1925) is a standard disk, stamped "179 1925", set vertically in the north wall of the Fire Station on the east side of the Embarcadero, between Piers 22 and 24. The bench mark is 10 inches from the west wall of the building and 6 inches above the sidewalk. Elevation: 12.02 feet above mean lower low water.

BENCH MARK C 109 (1932) is a standard disk, stamped "C 109 1932", set vertically in the north side of the concrete pillar forming the southeast corner of the Upjohn Building at the northwest corner of First and Howard Streets. The bench mark is 6 inches from a window sill and 4 feet higher than the sidewalk. Elevation: 24.00 feet above mean lower low water.

TIDAL BENCH MARKS

Rincon Point,
San Francisco (cont'd.)

BENCH MARK E 109 (1932) is a standard disk, stamped "E 109 1932", set vertically in the brick wall facing Second Street, at the building occupied by the United States Rubber Company, at the southwest corner of Folsom and Second Streets. The bench mark is 10 feet south of the office door and 4 feet higher than the walk. Elevation: 59.11 feet above mean lower low water.

The lower low water datum at Rincon Point is based on 14 high waters and 14 low waters, March 11-17, 1925, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	6.00
Mean high water	5.40
Half tide level	3.25
Sea-level datum of 1929 ...	3.21
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Union Iron Works, Potrero Point, San Francisco
Lat: 37°45' 5 Long: 122°23' 0

BENCH MARK 47 (1895) is the lower window shutter socket on the south side of the second window from the southwest corner of the building. The bench mark is located at the Potrero Plant of the Bethlehem Shipbuilding Corporation (main office at Twentieth and Illinois Streets), on the west side of the Pattern Storage building, near the south end of the building. Elevation: 17.93 feet above mean lower low water.

BENCH MARK 112 (1907) is a 2 3/4-inch circle enclosing a triangle, drilled on the west end of a step at the Potrero Plant of the Bethlehem Shipbuilding Corporation, on the north side of Twentieth Street, just west of the main gate, in the main entrance of the old Navy Building, on the granite step next to the bottom. The bench mark is about 100 yards east of Kentucky Street. Elevation: 16.41 feet above mean lower low water.

TIDAL BENCH MARKS

Union Iron Works, Potrero Point,
San Francisco (cont'd.)

BENCH MARK 113 (1907) is the top of a brass plate 2 feet high and 4 inches wide, above the word "LEVELS" and two feet above the ground at the Potrero Plant of the Bethlehem Shipbuilding Corporation, at the northeast corner of the old Navy Building, six inches south of the corner on the east side. Note: This mark is used by the shipyard for purposes of constructing and testing levels. Elevation: 15.04 feet above mean lower low water.

BENCH MARK 127, established by the City Engineer of San Francisco, is a triangle chipped out of the granite on the west side of Seventh Street between King and Townsend Streets, 125 feet southeast of Townsend Street, at the northeast end of the lowest step, at the main entrance to the three-story brick building occupied by the Baker, Hamilton & Pacific Company. Elevation: 15.57 feet above mean lower low water.

BENCH MARK 1 (1938) is a standard disk, stamped "NO 1 1938", set horizontally in concrete at the Potrero Plant of the Bethlehem Shipbuilding Corporation, at the north end of the west side of Slip No. 3, in the concrete footing of the west leg of the northerly bent. Elevation: 9.59 feet above mean lower low water.

BENCH MARK 2 (1938) is a standard disk, stamped "NO 2 1938", set in concrete at the Potrero Plant of the Bethlehem Shipbuilding Corporation, at the south end of the west side of Slip No. 3, in the concrete footing of the west leg of the southerly bent. Elevation: 12.65 feet above mean lower low water.

BENCH MARK 3 (1938) is a standard disk, stamped "NO 3 1938", set in concrete at the Potrero Plant of the Bethlehem Shipbuilding Corporation, in the Machine Shop on the south side of Twentieth Street, in the sidewalk on the east side of the entrance, and 15 feet south of the north side of the building. Elevation: 13.38 feet above mean lower low water.

BENCH MARK 4 (1938) is a standard disk, stamped "NO 4 1938", set in concrete at the Potrero Plant of the Bethlehem Shipbuilding Corporation, on the north side of the east wing of the main office building, on the west side of the entrance to the plant engineer's office, in the concrete threshold, 30 feet from the east end of the building. Elevation: 16.74 feet above mean lower low water.

BENCH MARK 5 (1938) is a standard disk, stamped "NO 5 1938", set in concrete at the intersection of Third and Sixteenth Streets, under the street railway viaduct, in the concrete footing of the second column south of Sixteenth Street, under the center of the viaduct. Elevation: 15.21 feet above mean lower low water.

TIDAL BENCH MARKS

Union Iron Works, Potrero Point,
San Francisco (cont'd.)

BENCH MARK G 109 (1932) is a standard disk, stamped "G 109 1932", set vertically at the northwest corner of Bryant and Division Streets, at the southeast corner of the St. Francis Ice Company building and in the top foundation stone of the east wall. Elevation: 24.72 feet above mean lower low water.

BENCH MARK H 109 (1932) is a standard disk, stamped "H 109 1932", set vertically at the southwest corner of Harrison and Twenty-first Streets, on the Harrison Street side of a five-story brick building occupied (in 1938) by the Ford Motor Company and in the brick pillar forming the northeast corner of the building. Elevation: 47.09 feet above mean lower low water.

The lower low water datum at Union Iron Works, Potrero Point is based on 8 months of automatic tide gage records, October 1919 - May 1920, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	9.0
Higher high water	6.30
Mean high water	5.70
Half tide level	3.45
Sea-level datum of 1929 ...	3.40
Mean low water	1.20
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Hunter Point (Point Avisadero)
Lat: 37°43'.8 Long: 122°21'.5

BENCH MARK 168 (1917) is a standard disk, stamped "Hunter Point B.M. 1 1917", set in a drill hole on the top of the north granite wall of the entrance to Drydock No. 5 at the U. S. Navy Drydocks, 5 inches north of the water edge of the wall, 24 feet east of the sill or cut in the wall against which the floating gate rests and about 52 feet east of the center of the capstan at the northeast corner of the drydock. The granite wall has been covered with plank- ing and the mark is reached through a 4-inch diameter hole bored in the planks. Elevation: 11.84 feet above mean lower low water.

TIDAL BENCH MARKS

Hunter Point,
(Point Avisadero) (cont'd.)

BENCH MARK 169 (1917) is a standard disk, stamped "Hunter Point B.M. 2 1917", set vertically in the west wall at the northwest corner of a small brick pump house between Drydocks Nos. 5 and 6 at the U. S. Navy Drydocks, about 75 feet east of the south end of the caisson of Drydock No. 6, about 100 feet east of the center of the capstan at the southeast corner of Drydock No. 6, 0.65 foot south of the north side of the brick wall of the pump house and about 6 inches above the paved ground level. Elevation: 12.21 feet above mean lower low water.

BENCH MARK 170 (1917) is a standard disk, stamped "Hunter Point B.M. 3 1917", set vertically in the south wall of the brick boiler room between Drydocks Nos. 5 and 6 at the U. S. Navy Drydocks, about 35 feet north of the north edge of Drydock No. 5, about 52 feet west of the southeast corner of the boiler room building, about 15 feet east of the center line of the door in the approximate center of the boiler room and 4 inches above the paved ground level. Elevation: 12.48 feet above mean lower low water.

BENCH MARK 4 (1941) is a standard disk, stamped "4 1941", set horizontally in the concrete loading platform at the northeast corner of a large concrete machine shop, Building No. 18, at the U. S. Navy Drydocks, about 100 feet south of Drydock No. 5, 6 inches north of the north wall of the building, about 5 inches west of the east edge of the loading platform and about $3\frac{1}{2}$ feet above the pavement level. Elevation: 15.66 feet above mean lower low water.

BENCH MARK 5 (1941) is a standard disk, stamped "5 1941", set horizontally in the loading platform at the southwest corner of a large concrete machine shop, Building No. 18, at the U. S. Navy Drydocks, about 260 feet south of Drydock No. 5, 6 inches south of the south wall of the building, 5 inches east of the west edge of the loading platform and about 3 feet above the pavement. Elevation: 15.73 feet above mean lower low water.

BENCH MARK HUNTER EAST (1941) is a standard triangulation station disk, stamped "HUNTER EAST 1941", set in a subsurface concrete retaining wall about 0.8 foot below the pavement of the yard and having a steel handhole and cover plate set over the mark at yard level. The bench mark is located on the south side of Drydock No. 6 at the U. S. Navy Drydocks, 93 feet south of the center line of the drydock, about 110 feet west by south of the south end of the drydock caisson and 64 feet west by north of the center of the capstan at the southeast end of the drydock. Elevation: 11.22 feet above mean lower low water.

TIDAL BENCH MARKS

Hunter Point,
(Point Avisadero) (cont'd.)

BENCH MARK HUNTER WEST 1 (1941) is a standard reference mark disk, stamped "HUNTER WEST 1 1941", set in a concrete monument, about 8 inches above the pavement at the head of Drydock No. 6 at the U. S. Navy Drydocks. The bench mark is covered with a steel handhole and coverplate and is located about 108 feet south by east of the center of the capstan at the head of the drydock, about 95 feet west by north of the fireplug on the south side and near the west end of the drydock and about 6 feet west of the inner rail of the 50-ton crane. Elevation: 11.72 feet above mean lower low water.

The lower low water datum at Hunter Point is based on 10 months of automatic tide gage records, January - October 1942, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ...	9.0
Higher high water	6.70
Mean high water	6.10
Half tide level	3.65
Sea-level datum of 1929	3.45
Mean low water	1.20
Lower low water datum	0.00
Lowest tide (estimated)	-2.5

Point San Bruno

Lat: 37°39'.0 Long: 122°22'.6

BENCH MARK 2 (1919) is the uppermost part of the bolt at the southwest corner of a concrete block 16 inches by 40 inches, which looks as though it was used to support a porch pillar and has in it four upright iron bolts. A small triangle is chiseled in the concrete around the bench mark bolt. The concrete block is inside of high barbed fence surrounding a small concrete building just back from the easternmost of the two small wharves fronting on the W. P. Fuller Paint Works. Elevation: 13.57 feet above mean lower low water.

BENCH MARK 4 (1919) is on a brick building just across a driveway and south of the building standing at the extreme northwest corner of the Fuller Paint Works. The building lies alongside and east of long shed of corrugated iron. At the northernmost end there is an entrance which has No. 3 above it. The upper part of the entrance is arched. On each side of the entrance there are three iron bars driven into the building on which could be fastened a door. The bench mark is the upper part of the lowest iron bar on the right-hand side on entering the building. Elevation: 20.52 feet above mean lower low water.

TIDAL BENCH MARKS

Point San Bruno (cont'd.)

BENCH MARK 1 (1930) is a standard disk set in top of rock 3 feet in diameter and 5 feet above low water line. The rock is located at low water line at north edge of first bight south of Point San Bruno. Elevation: 9.26 feet above mean lower low water.

BENCH MARK 2 (1930) is a standard disk set in the face of north wall of varnish building filter room at the Fuller Paint Works. It is about one foot above the ground and 56 feet from the northeast corner of the building which is constructed of corrugated iron. Elevation: 20.15 feet above mean lower low water.

BENCH MARK 3 (1897) is a standard disk set in cement between two crosses, 4 inches long, in the southeast corner of building No. 13, containing the animal fertilizing department of the Swift and Company packing works. The crosses are about 10 inches apart and about 3 feet above the ground. The bench mark is about 131 feet from the main or largest square brick chimney of the packing house. Note: The center line of the two crosses was the original bench mark established in 1897, but in 1917 a standard bench mark disk was inserted in the concrete foundation between them at exactly the same elevation. Elevation: 15.04 feet above mean lower low water.

BENCH MARK 4 (1930) is a standard disk set in the southernmost edge of a concrete walk about 26 feet from the southeast corner of building and 49 feet from the water's edge. The bench mark is located at the Fuller Paint Works on the east side of varnish building No. 4 and about 6 inches from face of wall. Elevation: 18.35 feet above mean lower low water.

BENCH MARK 5 (1941) is a standard disk, stamped "No. 5 '941", set in the center of the top of a large concrete base west of powder house, just inside the fence line around the building which is just north of the water line. This is the only structure on lot just west of W. P. Fuller auto parking section and entrance to plant. The concrete base is flat on top with four bolts protruding from it, one of which is Bench Mark 2 (1917). Elevation: 13.32 feet above mean lower low water.

The lower low water datum at Point San Bruno is based on 90 high waters and 90 low waters, October 15 - November 30, 1941, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

TIDAL BENCH MARKS

Point San Bruno (cont'd.)

	<u>Feet</u>
Highest tide (estimated) ..	9.5
Higher high water	6.90
Mean high water	6.30
Half tide level	3.75
Sea-level datum of 1929 ...	3.56
Mean low water	1.20
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

San Mateo Bridge

Lat: 37°35'.0 Long: 122°15'.0

BENCH MARK R.M. 2 Bridge (1939) is a standard reference mark disk, stamped "R M 2 Station Bridge", set on the ledge around toll pay station at the western approach of the San Mateo Bridge. Elevation: 17.18 feet above mean lower low water.

BENCH MARK 3 (1930)* is triangulation station GUANO ISLAND, located 40 feet east of the gate house to the San Mateo Bridge on a prolongation of the center line of the bridge. Elevation: 15.24 feet above mean lower low water.

BENCH MARK 4 (1930)* is the northwest reference mark at triangulation station GUANO ISLAND. It is about 150 feet north-northwest from the gate house at San Mateo Bridge on a dike about 10 feet inside a row of piling. Elevation: 10.88 feet above mean lower low water.

BENCH MARK 5 (1930)* is a standard disk set in north side of the pavement of the concrete bridge over San Mateo Slough. It is a few inches inside the guard rail and raised slightly above the pavement. It is near the center and highest part of the bridge. Elevation: 21.33 feet above mean lower low water.

BENCH MARK 6 (1930) is a standard disk set in the northeast corner of the base of the second lamp post east of the southeast corner of the intersection of Bay Shore Boulevard and Third Street, San Mateo. Elevation: 11.83 feet above mean lower low water.

BENCH MARK Y 109 = A 7 (1912) is a standard disk, stamped "Y 109 1932", set vertically in the south side of the Masonic Building on Ellsworth Avenue about 0.4 mile north of the Southern Pacific Railroad Station at San Mateo. The bench mark is about 10 feet from the southeast corner of the south side of the building and about 3 feet above the ground. Elevation: 29.36 feet above mean lower low water.

TIDAL BENCH MARKS

San Mateo Bridge (cont'd.)

BENCH MARK X 109 (1932) is a standard disk, stamped "X 109 1932", set in the west end of the north concrete abutment of the Southern Pacific Railroad Company steel bridge 17-E, over Monte Diablo Avenue in San Mateo. Elevation: 27.71 feet above mean lower low water.

BENCH MARK Z 109 (1932) is a standard disk, stamped "Z 109 1932", set vertically in the brick foundation of the Southern Pacific Railroad Station at San Mateo, 2 feet south of the east waiting room door, under the train bulletin board and $1\frac{1}{2}$ feet higher than the walk. Elevation: 31.86 feet above mean lower low water.

BENCH MARK Hydrant 170 (1939) is the top of the round ball on the water hydrant at the northwest corner of the intersection of the Bayshore Highway with Third Avenue of San Mateo. Elevation: 14.46 feet above mean lower low water.

BENCH MARK A 110 (1932) is a standard disk, stamped "A 110 1932", set in the top of a concrete post about 1.1 miles southeast along the Southern Pacific Company railroad from the station at San Mateo, in line with the south curb of a park at Twelfth Avenue and along Bartlett Court and 60 feet southwest of the track. Elevation: 16.49 feet above mean lower low water.

The lower low water datum at San Mateo Bridge is based on 7 months of automatic tide gage records, January 18 - February 28, 1930, and January 1 - June 13, 1931, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	<u>10.0</u>
Higher high water	7.40
Mean high water	6.80
Half tide level	4.00
Sea-level datum of 1929 ...	3.63
Mean low water	1.20
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

*Note: Considerable movement of these bench marks was noted in leveling of December 1939. The elevations should, therefore, be used with caution.

TIDAL BENCH MARKS

Smith Slough, San Mateo County
Lat: 37°30'.3 Long: 122°14'.2

BENCH MARK 1 (1931) is marked by a segment of a circle around the corner with an arrow pointing to the circle and letters "B.M." (no date or number). It is on the southernmost corner of concrete support for easternmost leg of first transmission tower north of large culvert on Bayshore Highway. Elevation: 9.65 feet above mean lower low water.

BENCH MARK 2 (1931) is a brass pin in center of top of square concrete monument for State Highway survey on east side of Bayshore grade. The monument is 6 inches square and projects one foot above the ground. It is marked with a large "G" on the side toward the highway. It is about 246 feet north along the highway from the culvert mentioned in description for Bench Mark 3. The bench mark is not numbered or dated. Elevation: 10.91 feet above mean lower low water.

BENCH MARK 3 (1931) is a standard disk, stamped "No. 3 1931", set on the top step of a stairlike pier under the center of the east end of a concrete culvert on Bayshore Highway, one mile north of the junction of this highway and Main Street, Redwood City. Elevation: 11.20 feet above mean lower low water.

The lower low water datum at Smith Slough is based on 51 high waters and 51 low waters, March 23 - April 21, 1931, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	<u>10.5</u>
Higher high water	7.90
Mean high water	7.30
Half tide level	4.25
Mean low water	1.20
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Redwood Creek, San Mateo County
Lat: 37°31'.0 Long: 122°12'.2

BENCH MARK 1 (1931) is a standard disk set in the concrete block supporting the outer and southeast leg of the two outer steel legs of the "Shell Unloading Crane" track at the Pacific Portland Cement Company's plant on Redwood Creek.

TIDAL BENCH MARKS

Redwood Creek,
San Mateo County (cont'd.)

BENCH MARK 2 (1931) is a standard disk set in a concrete manhole containing power lines and just in front of the side entrance to a "First Aid" wooden building of the Pacific Portland Cement Company's plant on Redwood Creek.

BENCH MARK 3 (1931) is a 3/4-inch iron bolt set in concrete at the base of the northwest leg of a transmission tower southeast of the Engineering and Administration Building of the Pacific Portland Cement Plant on Redwood Creek. The distance from Bench Mark 2 to Bench Mark 3 is about 500 feet.

BENCH MARK 4 (1931) is a railroad spike driven horizontally in a wooden pile 75 feet long projecting about one foot above ground. The pile is about 130 feet west of a watchman's gate at the entrance to the Pacific Portland Cement Company's plant, about 50 feet from a fence line and 7 feet north of north edge of eaves of the northern one of two automobile sheds. The spike is at the level of the ground on the southeast side of the pile. The distance from Bench Mark 3 to Bench Mark 4 is about 325 feet.

BENCH MARK 5 (1931) is a standard disk set in concrete at the base of the northwest leg of a Pacific Gas and Electric Company transmission tower just across the road from the new pumping unit installed by Redwood City for pumping sewage. The installation is about 1/3 mile south of a road leading to Redwood City Yacht Harbor. The distance from Bench Mark 4 to Bench Mark 5 is about one mile.

BENCH MARK F 7 (1912) is a standard disk set in the top of a stone or cement post about 4 feet long and projecting about 6 inches above the ground, in the north corner of the triangular grass park north of the Southern Pacific Railroad Station at Redwood City.

BENCH MARK H 110 (1932) is a standard disk, stamped "H 110 1932", set in the top of a concrete post, about 50 feet southwest of the tracks of the Southern Pacific Railroad at the northwest fence corner at the Brewster Street crossing in Redwood City.

Note: The bench marks in this vicinity appear to be settling and should be used with caution. The best available elevations of these marks, referred to the sea-level datum of 1929, may be obtained from the Director, U. S. Coast and Geodetic Survey, Washington, D. C.

TIDAL BENCH MARKS

Palo Alto Yacht Harbor, Mayfield Slough
Lat: 37°27'.4 Long: 122°06'.4

BENCH MARK 1 (1931) is a standard disk set in a concrete post surrounded by a concrete tile near the easternmost corner of the Palo Alto Yacht Clubhouse. Elevation: 10.97 feet above mean lower low water.

BENCH MARK 2 (1931) is a standard disk, set in the top of a large block of concrete about a third of a mile north of the Mackay Telegraph Company's radio mast near Palo Alto. The block is an anchor for one of the long wire guys bracing the mast. Its top is now (1931) about four feet above the level of the reclaimed marsh which as yet has received no fill. Elevation: 11.54 feet above mean lower low water.

BENCH MARK 3 (1931) is a standard disk set in the concrete base supporting the tall steel radio mast of the Mackay Telegraph Company near Palo Alto. The mast is the triangulation station known as "MAST COLLEY'S LANDING"-1925. Elevation: 8.94 feet above mean lower low water.

The lower low water datum at Palo Alto Yacht Harbor, Mayfield Slough is based on 3 months of automatic tide gage records, June 23 - October 1, 1931, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	<u>Feet</u>
Highest tide (estimated) ..	11.0
Higher high water	8.40
Mean high water	7.80
Half tide level	4.50
Mean low water	1.20
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Note: Because movement has been indicated by several lines of recent leveling in this area, the elevations of these bench marks, especially for Bench Mark 1, should be used with caution. The best available elevations of these marks, referred to the sea-level datum of 1929, may be obtained from the Director, U. S. Coast and Geodetic Survey, Washington, D. C.

TIDAL BENCH MARKS

Mountain View Slough (opposite Calaveras Point)Lat: 37°26'.9 Long: 122°04'.6

BENCH MARK Tower (1932) is the top corner of the angle plate at base of the steel tower of the Pacific Gas and Electric Company transmission line on the most southerly and easterly corner. The tower is located on the southeast side of the mouth of Mountain View Slough. Elevation: 13.95 feet above mean lower low water at Light No. 10; 14.00 feet above mean lower low water at Palo Alto Yacht Harbor.

This bench mark was connected by water and spirit levels with an automatic tide gage located at Light No. 10 off Calaveras Point. The lower low water datum at Light No. 10 is based on 2 months of observations, May 1 - June 30, 1932, reduced to mean values. The bench mark was also connected with three tidal bench marks established in the vicinity of Palo Alto Yacht Harbor, Mayfield Slough, where the lower low water datum is based on 3 months of automatic gage records, June 23 - October 1, 1931, reduced to mean values. The elevations of other tide planes at Light No. 10 and at Palo Alto Yacht Harbor, referred to this lower low water datum at the respective places, are as follows:

	<u>Light No. 10</u>		<u>Palo Alto Yacht Harbor</u>
	<u>Feet</u>		<u>Feet</u>
Highest tide (estimated) ..	11.0	.....	11.0
Higher high water	8.50	.....	8.40
Mean high water	8.00	.....	7.80
Half tide level	4.60	.....	4.50
Mean low water	1.20	.....	1.20
Lower low water datum	0.00	.....	0.00
Lowest tide (estimated) ...	-2.5	.....	-2.5

Alviso, Santa Clara CountyLat: 37°25'.3 Long: 121°58'.6

BENCH MARK 1 (1930) is a standard disk, stamped "No. 1 1930", set in the concrete base of a wooden pole of the Pacific Gas and Electric Company, just south of the road leading from the highway to the plant of the Bay Shell Company and about 100 yards south of Alviso Slough. The pole is just inside the fence between the railroad and the Pacific Gas and Electric Company's property. Elevation: 10.37 feet above mean lower low water.

BENCH MARK 2 (1930) is a standard disk, stamped "No. 2 1930", set in the southwest wing wall of the concrete highway bridge crossing Alviso Slough just east of the Bay Shell Company's plant, and about 0.4 mile north of the point where the road to Mountain View crosses the Southern Pacific tracks. The bridge bears the date "1928". The benchmark is about 3 feet from the bridge coping. Elevation: 15.09 feet above mean lower low water.

TIDAL BENCH MARKS

Alviso,
Santa Clara County (cont'd.)

BENCH MARK 3 (1930) is a standard disk, stamped "No. 3 1930", set in the concrete at the base of the railroad block signal No. 393, about one-third mile south of the railroad depot at Alviso and on the east side of the track. The signal is about 400 yards north of the highway bridge where Bench Mark 2 is located. Elevation: 12.99 feet above mean lower low water.

The lower low water datum at Alviso is based on 7 months of automatic tide gage records, December 11, 1930 - September 12, 1931, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	<u>11.5</u>
Higher high water	8.90
Mean high water	8.40
Half tide level	4.85
Mean low water	1.30
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Mud Slough (Drawbridge), Alameda County
Lat: 37°28'. 2 Long: 121°58'. 3

BENCH MARK 1 (1898) is a cross cut in the upper face of the concrete pier of the drawbridge near the southeast corner. The letters "U.S.B.M." were scratched on the concrete near the cross. Elevation; 8.29 feet above mean lower low water.

The lower low water datum at Mud Slough (Drawbridge) is based on 4 high waters and 4 low waters, October 21-23, 1898, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	<u>12.0</u>
Higher high water	9.40
Mean high water	8.70
Half tide level	5.00
Mean low water	1.30
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

TIDAL BENCH MARKS

Southern Pacific Railroad Bridge, Dumbarton Point
Lat: 37°29'.9 Long: 122°06'.5

BENCH MARK 2 (1923) is a bolt, stamped "2", on the top of the northwest pier of the west end of the most eastern span of the bridge and is located 6 inches north of an identification plate. It is also Southern Pacific Railroad Engineer Bench Mark 115.99. Elevation: 17.39 feet above mean lower low water.

BENCH MARK 4 (1923) is a standard disk, stamped "TIDAL NO 4", set in the south concrete pier at the east end of the bridge. The top of the bench mark is flush with the top of the pier and south of the bearing plate. Elevation: 17.32 feet above mean lower low water.

BENCH MARK 5 (1923) is a standard disk, stamped "TIDAL NO 5", set in a concrete pier under the southeast corner of the movable span. The bench mark is flush with the top of the pier and south of the bearing plate. Elevation: 17.19 feet above mean lower low water.

BENCH MARK 6 (1923) is a standard disk, stamped "TIDAL NO 6", set in a concrete pier under the southwest corner of the west span of the bridge. The bench mark is flush with the top of the pier and south of the bearing plate. Elevation: 17.18 feet above mean lower low water.

The lower low water datum at the Southern Pacific Railroad Bridge, Dumbarton Point is based on 1 year of automatic tide gage records at Dumbarton Highway Bridge, October 1936 - September 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	11.0
Higher high water	8.30
Mean high water	7.70
Half tide level	4.45
Mean low water	1.20
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

TIDAL BENCH MARKS

Dumbarton Highway Bridge
Lat: 37°30'.4 Long: 122°07'.0

BENCH MARK 6 A (1931) is the top of the southeast corner of the iron or steel bearing plate on the concrete pier at the north-east end of the lift span of Dumbarton Highway Bridge. The bearing plate is marked "6 A" and is located under the southwest corner of the first span east of the lift span of the bridge. This corner of the bearing plate has a slightly raised portion. The plate is about 2 inches above the concrete. Elevation: 17.60 feet above mean lower low water.

BENCH MARK 7 A (1931) is the top of the southeast corner of the bearing plate under the southeast corner of the first span east of the lift span at Dumbarton Highway Bridge, and is approximately 2 inches above the top of the concrete pier on which it rests. It is stamped "7 A". Elevation: 17.57 feet above mean lower low water.

BENCH MARK TIDAL 319 is an unmarked point on the top of the southeast corner of a bearing plate and about 11 inches above the top of the concrete pier at the northeast end of Dumbarton Highway Bridge, about 7.2 miles northeast of Palo Alto. The bench mark is located at the southeast corner of the first span of the bridge. Elevation: 18.05 feet above mean lower low water.

BENCH MARK 8 (1931) is a standard disk, stamped "NO 8 1931", set in a concrete post 3 feet deep, 16 inches wide at the bottom and 12 inches wide at the top, in the south fence line of Dumbarton Highway. It is about 110 yards east of the end of the bridge, just east of a "NO PARKING" sign on the fence and 7 posts beyond the gateway to gravel piles and storage lot of the Dumbarton Bridge Company. Elevation: 10.75 feet above mean lower low water. CAUTION: See note below.

BENCH MARK 9 (1931) is a standard disk, stamped "TIDAL 9 1931", set in the concrete curb on the south side of Dumbarton Highway Bridge, just inside the last iron post at the east end of the bridge. Elevation: 19.20 feet above mean lower low water. CAUTION: See note below.

BENCH MARK K 175 (1934) is a standard disk, stamped "K 175 1934", set in the top of a concrete post, about 0.7 mile northeast along the Dumbarton Bridge road to Newark from the northeast end of the bridge, about 200 feet southwest of a wooden culvert, at the southeast fence line and at a "NO PARKING" sign. Elevation: 12.69 feet above mean lower low water.

TIDAL BENCH MARKS

Dumbarton Highway Bridge(cont'd.)

BENCH MARK L 175 (1934) = 2635 (California Geodetic Survey) is a standard disk, stamped "L 175 1934", set in the top of a concrete post, about 1.3 miles northeast along the Dumbarton Bridge road to Newark from the northeast end of the bridge, 12 feet north-east of the center of gate 13, 15 feet northwest of the center line of the highway and 3 feet northwest of the northwest right-of-way fence. Elevation: 12.08 feet above mean lower low water.

BENCH MARK M 175 (1934) is a standard disk, stamped "M 175 1934", set in the top of a concrete post, about 2.0 miles northeast along the Dumbarton Bridge road to Newark from the northeast end of the bridge, at the junction with a levee, at the west end of the levee and at the south road fence. Elevation: 14.52 feet above mean lower low water.

BENCH MARK 4 (1930) is a standard disk, stamped "TIDAL 4 1930", set in the top of a large prominent boulder about 100 feet south of the highway leading to the east approach of the Dumbarton Highway Bridge and about $3\frac{1}{2}$ miles from the end of the bridge. The bench mark is near Jarvis Landing, Newark Slough. It is just west of a prominent borrow pit and about 150 feet southeast of a pump house for the salt works. There is a grove of small trees directly to the south of the bench mark. Elevation: 40.86 feet above mean lower low water.

BENCH MARK 5 (1930) is a standard disk, stamped "TIDAL 5 1930", set in a drill hole in the center of the top of a concrete culvert header on the south side of the highway leading to the east approach of the Dumbarton Highway Bridge and about $3\frac{1}{2}$ miles from the end of the bridge. The bench mark is near Jarvis Landing, Newark Slough. It is about 70 feet north of the salt works pump house and just south of the bend in the highway at the foot of the grade. Elevation: 9.70 feet above mean lower low water.

The lower low water datum at Dumbarton Highway Bridge is based on 1 year of automatic tide gage records, October 1936 - September 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	11.0
Higher high water	8.30
Mean high water	7.70
Half tide level	4.45
Mean low water	1.20
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

TIDAL BENCH MARKS

Dumbarton Highway Bridge (cont'd.)

Note: The bench marks in this area are apparently shifting as indicated by several lines of leveling over the period from 1930 to 1940, and the elevations of these bench marks should be used with caution. Bench Marks 8 and 9 have apparently settled more than a foot since they were established in 1931. The best available elevations of these marks, referred to the sea-level datum of 1929, may be obtained from the Director, U. S. Coast and Geodetic Survey, Washington, D. C.

Off Roberts Landing
Lat: 37°40'.2 Long: 122°11'.6

BENCH MARK 1 (1930) is a standard disk set in top of the most northwesterly pier of five concrete piers in line which formed the offshore foundation of a building and are located in a northwest-southeast direction. These piers are all that is left of the building at triangulation station ROBERTS LANDING MAIN BUILDING - 1925. These piers are covered at high water. Elevation: 8.17 feet above mean lower low water.

BENCH MARK 2 (1930) is a standard disk set in the top of the concrete pier in line between Bench Marks 1 and 3 and on the pier adjacent to Bench Mark 3. These piers are all that is left of the building at triangulation station ROBERTS LANDING MAIN BUILDING - 1925. These piers are covered at high water. Elevation: 7.88 feet above mean lower low water.

BENCH MARK 3 (1930) is a standard disk set in the top of the most southeasterly pier of five concrete piers in line which formed the offshore foundation of the building and are located in a northwest-southeast direction. These piers are all that is left of the building at triangulation station ROBERTS LANDING MAIN BUILDING - 1925. These piers are covered at high water. Elevation: 7.97 feet above mean lower low water.

The lower low water datum off Roberts Landing is based on two months of automatic tide gage records, December 1, 1930 - January 31, 1931, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	<u>10.0</u>
Higher high water	7.20
Mean high water	6.60
Half tide level	3.90
Mean low water	1.20
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

TIDAL BENCH MARKS

Oakland Municipal Airport, Oakland
Lat: 37°43'.9 Long: 122°12'.5

BENCH MARK 1 (1936) is a standard disk, stamped "1 1936", set in the concrete base of a radio antenna pole, located on the south side of San Leandro Bay at the Oakland Municipal Airport. The bench mark is east of Hangar No. 5 (United Air Lines) on line with the south face of the hangar and 100 feet northeast of the east corner. Elevation: 5.55 feet above mean lower low water.

BENCH MARK 2 (1936) is a standard disk, stamped "2 1936", set on top of a concrete block, 2 feet above the sidewalk level. The bench mark is located on the south side of San Leandro Bay at Oakland Airport, at the northeast corner of Hangar No. 4 (United Air Lines). Elevation: 6.23 feet above mean lower low water.

BENCH MARK 3 (1936) is a standard disk, stamped "3 1936", set on top of a concrete block 2 feet above the street level. The bench mark is located in Oakland on the south side of San Leandro Bay at the Oakland Municipal Airport. It is at the northeast corner of Hangar No. 3 (United States Navy). Elevation: 7.46 feet above mean lower low water.

BENCH MARK 4 (1936) is a standard disk, stamped "4 1936", set on top of a concrete culvert, located in Oakland at the Oakland Municipal Airport. It is near the intersection of Maitland Drive, Jones Avenue and Earhart Road, on the east side of Jones Avenue and 25 feet northeast of the Southern Pacific Railroad track. Elevation: 10.15 feet above mean lower low water.

BENCH MARK 5 (1936) is a standard disk, stamped "5 1936", set in the concrete foundation of the southeast leg of a steel tower which is one of a line supporting high voltage cables. The bench mark is located in Oakland, one mile east of the Oakland Municipal Airport. It is on Jones Avenue, 390 yards east of San Leandro Creek and 4 feet west of the west side of Jones Avenue. Elevation: 15.09 feet above mean lower low water.

BENCH MARK 6 (1936) is a standard disk, stamped "6 1936", set in the southeast leg of the south water tank 50 feet east of the Western Pacific Railroad tracks in the Elmhurst District. The bench mark is located at 921 98th Avenue on the property of the Standard Brands Company of California (Fleishmann Yeast). Elevation: 26.90 feet above mean lower low water.

TIDAL BENCH MARKS

Oakland Municipal Airport,
Oakland (cont'd.)

BENCH MARK 23, established by Port of Oakland authorities, is the head of a copper nail imbedded in the top of a concrete post 12 inches by 12 inches, set flush with the street, located in Oakland on the south side of San Leandro Bay at the Oakland Municipal Airport. The bench mark is on the east side of the street between Hangars No. 3 and No. 4. It is 8 feet northwest of a fire hydrant. Elevation: 4.39 feet above mean lower low water.

BENCH MARK 27, established by Port of Oakland authorities, is the head of a copper nail imbedded in the top of a concrete post 12 inches square, set flush with the street level. The bench mark is located in Oakland on the south side of San Leandro Bay at the Oakland Municipal Airport. It is northeast of Hangar No. 4, on the east side of the pavement and 30 feet northwest of the north face of Hangar No. 4. Elevation: 3.74 feet above mean lower low water.

BENCH MARK City Monument (98th and Walter Avenues), established by City of Oakland authorities, is a copper nail set in a concrete post 4 inches in diameter, the latter being set in a cast-iron pipe 8 inches in diameter. The bench mark is located in Oakland, southeast of San Leandro Bay, at the intersection of 98th Avenue and Walter Avenue. The bench mark is 6 inches below the surface of the road. A cast iron cover is over the mark. The inscription "CITY MONUMENT" is cast in the cover. Elevation: 23.37 feet above mean lower low water.

BENCH MARK City Monument (Jones Avenue and Road No. 1), established by City of Oakland authorities, is a copper nail set in a concrete post 4 inches in diameter. A cast-iron pipe, 8 inches in diameter surrounds the bench mark. The mark is located in Oakland, southeast of San Leandro Bay, at the intersection of Jones Avenue and Road No. 1, about 185 feet west of Clara Street, in the center of the roadway. It is about 6 inches below the surface of the road. A cast iron cover is over the bench mark. The inscription "CITY MONUMENT" is cast in the cover. Elevation: 17.22 feet above mean lower low water.

BENCH MARK RM 3 TABLE is a standard reference mark, stamped "3-TABLE", set in the top of a concrete post at the Oakland Municipal Airport, Oakland. The bench mark is located near the Airport Hotel Building, 50 feet southwest of the northwest corner of the building. It is at the western edge of a shrubbery bed. Elevation: 5.79 feet above mean lower low water.

TIDAL BENCH MARKS

Oakland Municipal Airport,
Oakland (cont'd.)

BENCH MARK PORT OF OAKLAND, established by Port of Oakland authorities, is a brass plug $3/4$ inch in diameter, center-punched and imbedded in a concrete-filled pipe, 3 inches in diameter. An iron pipe 8 inches in diameter surrounds the bench mark. The bench mark is located in Oakland at the Oakland Municipal Airport. It is at the intersection of Maitland Drive, Jones Avenue and Earhart Road, in the center of Maitland Drive, 10 feet south of the Southern Pacific Railroad track. The bench mark is 8 inches below the street surface. A cast-iron cover 8 inches in diameter is over the bench mark. The inscription "Port of Oakland" is cast in the cover. Elevation: 10.29 feet above mean lower low water.

BENCH MARK OAKLAND 10 (1932) is a standard disk, stamped "OAKLAND 10 1932 33.156", set in the top of a concrete post, located at Oakland, on Jones Avenue, between B and C Streets, in the center of Elmhurst Park, on the east side of a circle and between the circle and a lamp post. Elevation: 36.35 feet above mean lower low water.

BENCH MARK B 51 (1929) is a United States Geological Survey standard disk, stamped "B 51 1929", set in the top of the south concrete rim of the ventilator shaft on the south side of Stonehurst School, near the center of the building, east of the boiler room. The bench mark is located at Elmhurst, Alameda County, at 104th and Biggareau Streets. Elevation: 32.93 feet above mean lower low water.

The lower low water datum at Oakland Municipal Airport is based on one year of automatic tide gage records, September 1936 - August 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	9.0
Higher high water	6.50
Mean high water	5.90
Half tide level	3.50
Sea-level datum of 1929 ...	3.19
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

TIDAL BENCH MARKS

Alameda (Municipal Light Pier)Lat: 37°45'.5 Long: 122°14'.9

BENCH MARK 3 (1917) is a standard disk, stamped "3 1917", set in the top of the concrete sea wall, close to a right angle, about 200 feet west of Park Street and about 80 feet south of Otis Drive, in the south part of Alameda. It is about 250 feet southwest of the Alameda Municipal Electric Light plant. Elevation: 10.75 feet above mean lower low water.

BENCH MARK 5 (1920) is a standard disk, stamped "5 1920", set vertically in the south side of the north concrete gate post of the southernmost gateway at the Alameda Municipal Electric Light plant at the northeast corner of Park Street and Otis Drive. The bench mark is about 2.35 feet above the concrete driveway. Elevation: 14.24 feet above mean lower low water.

The lower low water datum at Alameda (Municipal Light Pier) is based on 6 high waters and 6 low waters, February 18-21, 1920, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	6.70
Mean high water	6.10
Half tide level	3.60
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Mercantile Box Company Wharf, San Leandro BayLat: 37°45'.6 Long: 122°13'.3

BENCH MARK 1 (1920) is the top surface of a nut on the southwest corner of the lumber wharf near the east end of the Tidal Canal, where it runs into San Leandro Bay. It is surrounded by a triangle of nail heads. Elevation: 10.74 feet above mean lower low water.

BENCH MARK 2 (1920) is a standard disk set into a cylindrical mass of concrete flush with the top surface of the ground. Elevation: 10.80 feet above mean lower low water.

BENCH MARK 4 (1920) is the highest point of the right-hand one of two railroad irons set diagonally in the ground at the corner of a building in the Enterprise Lumber Company's yard and on the opposite side of the railroad track from a fire hydrant about 60 feet east of a tank which is 40 feet distant. The tank is 91 feet westerly on the other side of the railroad track. Elevation: 12.47 feet above mean lower low water.

TIDAL BENCH MARKS

Mercantile Box Company Wharf,
San Leandro Bay (cont'd.)

The lower low water datum at the Mercantile Box Company Wharf, San Leandro Bay, is based on 6 high waters and 6 low waters, February 18-21, 1920, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	6.30
Mean high water	5.70
Half tide level	3.40
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Oakland (Park Street Bridge)
Lat: 37°46'.4 Long: 122°14'.2

BENCH MARK 1 (1932) is a standard disk, stamped "BM 1 1932", set in the south corner of the southwest footing of the foundation of the tank on the northeast corner of the intersection of Glasscock and Peterson Streets. Elevation: 14.81 feet above mean lower low water.

BENCH MARK 2 (1932) is a standard disk, stamped "BM 2 1932", set in the northeast corner of the stone door slab of the center entrance of the Lazear School, 824 -29th Avenue. Elevation: 27.57 feet above mean lower low water.

BENCH MARK 3 (1932) is a standard disk, stamped "BM 3 1932", set in the north curb on East 9th Street, about 30 feet west of 29th Avenue line at the intersection of East 9th Street and 29th Avenue. Elevation: 25.34 feet above mean lower low water.

The lower low water datum at Oakland (Park Street Bridge) is based on 5 months of automatic tide gage records, January - May, 1932, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	9.0
Higher high water	6.30
Mean high water	5.70
Half tide level	3.40
Sea-level datum of 1929 ...	3.15
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

TIDAL BENCH MARKS

Oakland (Inner Harbor)
Lat: 37°47' 7 Long: 122°16' 9

BENCH MARK Port 1 (1936) is a standard disk, stamped "PORT 1 1936", set on top of the concrete sea wall, near north edge, 16 feet west of the west wall of Clay Street Pier and 7 feet west of a fire plug, at the foot of Clay Street. Elevation: 9.76 feet above mean lower low water.

BENCH MARK Port 2 (1936) is a standard disk, stamped "PORT 2 1936", set vertically in the concrete wall at the southwest corner of First and Jefferson Streets, in the east wall of the Pacific Gas & Electric Company Steam Power Plant No. "C", $1\frac{1}{2}$ feet south of the northeastern corner and 3 feet above sidewalk. Elevation: 13.38 feet above mean lower low water.

BENCH MARK OAKLAND 5 (1932) is a standard disk, stamped "OAKLAND 5 1932 6.844", set in the top of the concrete sea wall and at an angle in the wall, located about 175 feet northeast of the northeast corner of Market Street Pier on Oakland Estuary. Elevation: 9.91 feet above mean lower low water.

BENCH MARK 11 (1936) is a standard disk, stamped "11-1936", set in the concrete loading platform at the northwest corner of the Port of Oakland Grove Street Pier building located on Quay Street at the foot of Grove Street. Elevation: 13.26 feet above mean lower low water.

BENCH MARK 12 (1936) is a standard disk, stamped "12-1936", set vertically in the west face of the Southern Pacific Railroad station near the southwest corner of the building located near the northeast corner of Broadway and First Street. The bench mark is one foot above the ground. Elevation: 13.41 feet above mean lower low water.

BENCH MARK 24 (U.S.G.S.) is a United States Geological Survey standard disk, stamped "24.298", set vertically in the wall on the north side of the Broadway entrance on the west face of the Hall of Records Building, located on Broadway between Fourth and Fifth Streets. The bench mark is about 4 feet above the ground. Elevation: 27.36 feet above mean lower low water.

BENCH MARK B 54 (U.S.G.S.) is a United States Geological Survey standard disk stamped "B 54 1929 18.888", set in the top of the water table on the southwest corner of the superstructure over the north portal of the Posey Tube to Alameda, at Fourth and Harrison Streets. Elevation: 21.95 feet above mean lower low water.

TIDAL BENCH MARKS

Oakland (Inner Harbor) (cont'd.)

BENCH MARK W 385 (1937) is a standard disk, stamped "W 385 1937", set in the horizontal base of the northwest arched niche facing Alice Street, on the post office building on the southeast corner of 13th and Alice Streets. Elevation: 43.37 feet above mean lower low water.

BENCH MARK X 385 (1937) is a standard disk, stamped "X 385 1937", set on the top step in the northeast corner of the northeast entrance to the courthouse building on 13th Street, between Fallon and Oak Streets. Elevation: 27.11 feet above mean lower low water.

BENCH MARK 16 (1936) is a standard disk, stamped "16 1936", set in the west corner of the concrete base of a lattice, steel pole, which is one of a line of poles supporting high voltage cables between Oakland and Alameda. The bench mark is located in West Oakland on the south side of Middle Harbor Road, 700 yards west of Adeline Street. Elevation: 11.62 feet above mean lower low water.

BENCH MARK 13 (1936) is a standard disk, stamped "13 1936", set vertically in the west face of the concrete base of semaphore No. 1500, located on the south side of the Western Pacific Railroad track near the southeast end of the Western Pacific Railroad Company Mole. Elevation: 12.29 feet above mean lower low water.

BENCH MARK 14 (1936) is a standard disk, stamped "14 1936", set on the second track north of the Oakland Estuary in the southwest corner of the concrete foundation pit for a Fairbanks railroad car weighing scale. The bench mark is located near the southeast end of the Western Pacific Railroad Company Mole. Elevation: 11.64 feet above mean lower low water.

BENCH MARK 15 (1936) is a standard disk, stamped "15 1936", set on top of a large black rock in the rip-rap facing of the Western Pacific Railroad Company Mole. This rock extends further south into the Oakland Estuary than any nearby rock. The mark is located on the south bank of the mole, 1400 yards southeast of the western end of the mole and due north of the Alameda Airport aero beacon. Elevation: 8.88 feet above mean lower low water.

The lower low water datum at Oakland (Inner Harbor) is based on 12 months of automatic tide gage records, May 1936 - June 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

TIDAL BENCH MARKS

Oakland (Inner Harbor) (cont'd.)

	Feet
Highest tide (estimated) ..	9.0
Higher high water	6.20
Mean high water	5.60
Half tide level	3.35
Sea-level datum of 1929 ...	3.06
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Alameda Naval Air Station
Lat: 37°46'.6 Long: 122°17'.9

BENCH MARK 8 (1939) is a standard disk, stamped "No. 8 1939", set in a drill hole in the top of the concrete curb on the north side of the Tender Pier on the south side of the lagoon at the south-east corner of the Naval Air Station. Elevation: 12.57 feet above mean lower low water.

BENCH MARK 9 (1939) is a standard disk, stamped "NO. 9 1939", set in the top of the concrete curb of the Tender Pier on the south side of the lagoon at the southeast corner of the Naval Air Station, in the center of the west end of the dock which is in the form of a semicircle. Elevation: 12.64 feet above mean lower low water.

BENCH MARK "U.S.N. TENDER" is a 1-inch diameter brass plug set in the concrete deck of the Tender Pier, at the south side of the Lagoon at the Naval Air Station, in the center of the east-west axis of the pier at the west end, 1.75 feet east of Bench Mark 9 (1939), which is set in the top of the concrete curb. The end of the pier is in the form of a semicircle and the mark is slightly above the concrete surface of the deck. Elevation: 11.83 feet above mean lower low water.

BENCH MARK "U.S.N. CARRIER" is a 1-inch diameter brass plug set in a drill hole in the concrete deck of the Carrier Pier at the south side of the Lagoon at the Alameda Naval Air Station. The bench mark is slightly above the concrete surface of the pier deck, in the east-west center line of the pier and about 1,000 feet east of the west or sea end, 5.05 feet north of the south face of the approach pier, which comes in at an angle. Elevation: 15.35 feet above mean lower low water.

TIDAL BENCH MARKS

Alameda Naval Air Station (cont'd.)

BENCH MARK "U.S.N. LAGOON (S.E. Corner)" is a 1-inch diameter brass plug set in a drill hole in the cap rock of the sea wall at the southeast corner of the Lagoon. The bench mark is slightly above the level of the rock, about level with the ground surface back of the sea wall, at the intersection (northwest corner) of Fifth Street and the road leading onto the Tender and Carrier Piers and is in line with three brass plugs along the east side of the Lagoon - approximately north and south. Elevation: 11.85 feet above mean lower low water.

BENCH MARK "U.S.N. LAGOON (Center)" is a 1-inch diameter brass plug set in a drill hole in the cap rock of the sea wall on the east side of the Lagoon, approximately in the center of the lagoon, opposite and between doors No. 7 & 9 in a galvanized iron building on the east side of Fifth Street, about level with the ground surface back of the sea wall and just slightly above the level of the rock. Elevation: 10.68 feet above mean lower low water.

BENCH MARK "U.S.N. LAGOON (N.E. Corner)" is a 1-inch diameter brass plug set in a drill hole in the concrete retaining wall of the concrete airplane landing field and sea wall on the north side of the Lagoon at its northeast corner, 2.3 feet north of the south edge of the sea wall and 7.4 feet east of Bench Mark 7 (1939). The bench mark is slightly above the level of the concrete of the sea wall. Elevation: 9.54 feet above mean lower low water.

BENCH MARK 7 (1939) is a standard disk, stamped "NO. 7 1939", set in a drill hole in the top of the concrete sea wall at the northeast corner of the lagoon, 12 feet west of the end of the sea wall, $2\frac{1}{2}$ feet north of its south side and at the southwest corner of the concrete airplane landing field. Elevation: 9.54 feet above mean lower low water.

BENCH MARK 6 (1938) is a standard disk, stamped "NO. 6 1938", set in the center of a 4-foot square concrete block supported by four piles driven down to a solid foundation. A metal cylinder 18 inches in diameter has been placed over the mark and it is about 3 feet below the surface of the railroad roadbed, 4.9 feet north of the center line of the track and 70 feet east of the southeast corner of General Storehouse Proper, Building 8. Elevation: 10.70 feet above mean lower low water.

TIDAL BENCH MARKS

Alameda Naval Air Station (cont'd.)

BENCH MARK "U.S.N. Water Tank (North)" is a 1-inch diameter brass plug set in a drill hole in the top and in the north-south center (0.5 foot east of the west side) of the west concrete foundation footing (western one of six footings) for the north one of three steel water tanks at the Alameda Naval Air Station. Water tank is known as Building 33, about 146 feet east of the east curb of Fifth Street, nearly on the prolongation of the south curb of Avenue D and about $1\frac{1}{2}$ feet above the ground. Elevation: 15.23 feet above mean lower low water.

BENCH MARK NAVY 17 (1939), established by the United States Naval authorities, is a 1-inch brass plug set in the top of a concrete cylinder 10 inches in diameter. The mark is 1 foot below ground level, 3.6 feet east of $2\frac{1}{2}$ -foot diameter iron manhole (electric), 46.4 feet east of center of iron street lightpost on the center line of Fourth Street and on the south curb of Avenue C, 13.8 feet south of the south curb line of Avenue C and 28.4 feet east of the prolongation of the east curb of Fourth Street. A concrete tile six inches in diameter is placed around the mark. Elevation: 12.34 feet above mean lower low water.

BENCH MARK NAVY 2 (1939), established by the U. S. Navy, is a 1-inch brass plug set in the top of a concrete cylinder 10 inches in diameter, 2.4 feet below the ground level and protected by a 10-inch diameter vitrified clay pipe, located in the center of a flower bed with concrete walks leading in from the four cardinal directions, between Avenues B and C, on the north-south axis of construction and on the east-west axis of the enlisted men's barracks. Elevation: 10.71 feet above mean lower low water.

BENCH MARK NAVY 3 (1939), established by the U. S. Navy, is a 1-inch brass plug set in the top of a 10-inch diameter concrete cylinder, 3 feet below the ground level and protected by a 12-inch diameter vitrified clay pipe, located in the flower bed between the north (main) gate and the Administration Building, $68\frac{1}{2}$ feet north of the center line of Avenue B and along the north-south axis of construction. Elevation: 8.91 feet above mean lower low water.

BENCH MARK 10 (1942) is a standard disk, stamped "10 1942", set horizontally in a drill hole in the concrete walk around the Sentry Box (Building 31) in the center of the Main Gate (north entrance) to the Naval Air Station, on the east side of the Sentry Box and at the north end, 0.74 foot east of the east wall of the building, $2\frac{1}{4}$ feet west of the east side of the walk, $7\frac{1}{2}$ feet south of the north end of the building, which is rounded, 2.6 feet south of the heavy iron, vertical hinge of the iron gate, which is set in the concrete walk as a base and 0.3 foot above the street level. Clearance under the eave of the building over the mark is 9.2 feet. Elevation: 9.96 feet above mean lower low water.

TIDAL BENCH MARKS

Alameda Naval Air Station (cont'd.)

BENCH MARK "GATE" = Boundary 20 (U.S.N.) is a $\frac{1}{4}$ -inch copper plug set in the top of a 6-inch square concrete monument projecting about 4 inches above the ground. It is located just outside the north fence of the Naval Air Station, about 570 yards west of the old northeast corner of the property, about 20 feet east of a catch basin in the ditch, about 8 feet north of the fence and 40.3 feet south of the center line of a four-lane paved highway. Elevation: 9.10 feet above mean lower low water.

BENCH MARK "Northeast Corner" (1938), established by United States Naval authorities, is a $\frac{1}{4}$ -inch copper plug set in a pyramidal concrete post, 6 inches square at the top, projecting about 10 inches above the ground, 13.6 feet north of the Naval Air Station fence, 27.3 feet south of the center line of a paved four-lane highway. It is in the graveled shoulder of the highway and about $2\frac{1}{2}$ feet from the edge of the pavement. Note: The mark has been hit and the copper plug is bent over although the concrete seems undisturbed. Elevation: 9.15 feet above mean lower low water.

BENCH MARK T.B.M. 1 (1942) is the top of the southeast bolt of four in the concrete foundation for the block signal system of the Southern Pacific Railroad Mole, about $\frac{1}{4}$ mile west of Main Gate of the Air Station, on the north side of the remaining railroad track, south of the third electric pole from the west end of a line of poles along the water's edge. Elevation: 9.89 feet above mean lower low water.

BENCH MARK T.B.M. 2 (1942) is the top of the southwest bolt of four in old concrete foundation block signal system of the Southern Pacific Railroad Mole, about 0.55 mile west of the Main Gate, on the north side of the one remaining track, the west block of two and just east of where electric line poles along water's edge start again leading west. Elevation: 10.14 feet above mean lower low water.

BENCH MARK T.B.M. 3 (1942) is the top of the southeast bolt of four in old concrete foundation for the block signal system of the Southern Pacific Railroad Mole in Alameda, about 0.8 mile west of the Main Gate, on north side of the one remaining track, the east block of two and just south of the last electric line pole along the water's edge where second break in the line of poles occurs after leaving the U. S. Navy Main Gate. Elevation: 9.94 feet above mean lower low water.

TIDAL BENCH MARKS

Alameda Naval Air Station (cont'd.)

BENCH MARK 5 (1936) is a standard disk, stamped "5 1936", set in the concrete base for what was formerly a semaphore tower on the south side of the Southern Pacific Railroad Company track about one mile west of the Main (north) Gate of the Naval Air Station, 93 feet west of the prolongation of the west side of the center building (no. 52) of three concrete buildings on the Air Field, 91.3 feet north of the Naval Air Station fence and about 735 yards west of Sewage Disposal Plant (Building No. 28). Elevation: 10.35 feet above mean lower low water.

BENCH MARK TRIANGULATION STATION AIR (1929) is a standard triangulation disk, stamped "AIR 1929", set in the top of a concrete monument about $1\frac{1}{4}$ miles west of the Main Gate (north entrance) to the Naval Air Station, about 100 feet north of the remaining main line track of the old Southern Pacific Railroad Mole, about 25 feet south of the storm water line of the Estuary, about 20 feet west of the prolongation of a north-south line through the gate at the northwest end of the Air Field and leading to a garbage dump. Note: This mark is set at a slope and very poor for levels. Center of the triangle was used for the elevation. Elevation: 11.08 feet above mean lower low water.

BENCH MARK T.B.M. 4 (1942) is the top of the southeast bolt of five in old concrete foundation for the block signal system of the Southern Pacific Railroad Mole in Alameda, about $1\frac{1}{2}$ miles west of the Main Gate, about 52 feet north of the present main track, about 25 feet southwest of the southwest corner of a 8-foot by 10-foot concrete power station (deserted). Elevation: 13.20 feet above mean lower low water.

BENCH MARK AIRPORT 2 (1936) is a standard disk, stamped "AIRPORT 2 1936", set on the northwest corner of the concrete bumper at the end of the old railroad track No. 9. It is located near the east side of the Southern Pacific Railroad Company interurban terminal building near the west end of the mole. In August 1942 it was reported that only two tracks remain and the bench mark is about 55 feet south of the only main track left and about 1.65 miles west of the Main (north) Gate of the Naval Air Station. Elevation: 15.83 feet above mean lower low water.

The lower low water datum at Alameda Naval Air Station is based on 2 years of automatic tide gage records, 1940-1941, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

TIDAL BENCH MARKS

Alameda Naval Air Station (cont'd.)

	Feet
Highest tide (estimated) ..	9.0
Higher high water	6.40
Mean high water	5.80
Half tide level	3.45
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Note: This area appears to be unstable. Considerable settlement of some of the bench marks was indicated in recent leveling. The elevations given in the above list are based on leveling in August 1942. They should be used with caution.

Oakland Mole (Seventh Street)
Lat: 37°48'.6 Long: 122°19'.7

BENCH MARK 3 (1917) is a standard disk, stamped "3 1917", set in the top of the stone footing of a steel column at the northwest corner of the higher tank tower near the west end of the Southern Pacific Railroad Oakland Mole (Seventh Street). The tank is north of the passenger train sheds and between the inbound and outbound roadways to the automobile ferry. Elevation: 14.84 feet above mean lower low water.

BENCH MARK 4 (1917) is a standard disk, stamped "4 1917", set in the top of the stone footing of a steel column at the northeast corner of the higher tank tower near the west end of the Southern Pacific Railroad Oakland Mole (Seventh Street). The tank is north of the passenger train sheds and between the inbound and outbound roadways to the automobile ferry. Elevation: 14.86 feet above mean lower low water.

BENCH MARK 5 (1917) is a standard disk, stamped "5 1917", set in the concrete footing of a column at the recess in the train shed of the Southern Pacific Railroad Oakland Mole. It is at the northeast corner of the larger or west section of the train shed and is about 200 feet east of the main line train bumpers and on the outside of the shed wall. Elevation: 13.33 feet above mean lower low water.

TIDAL BENCH MARKS

Oakland Mole
(Seventh Street) (cont'd.)

BENCH MARK "ALBERS" (C.S.H.D.), established by the California State Highway Department, is a brass plug set in the top of a 12-inch pipe filled with concrete, at Oakland Mole, on the right-of-way of the Southern Pacific Railroad, about 50 yards east of the east end of the concrete platform north of a side track at Albers Mill, 32 feet north of the north main track and 6 feet south of the south edge of the pavement at the crossing. Elevation: 13.26 feet above mean lower low water.

The lower low water datum at Oakland Mole is based on 4 months of automatic tide gage records, June - September, 1930, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	6.00
Mean high water	5.40
Half tide level	3.25
Sea-level datum of 1929 ...	3.03
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

Yerba Buena Island and Treasure Island
Lat: 37°48'.8 Long: 122°21'.5

BENCH MARK 5 = Y B 16 (1920) is a standard disk imbedded in bed rock, located on the northeast point of Yerba Buena Island, 45 yards north of the United States Army dock. It is on a rocky ledge situated in a small bight in the shoreline. Elevation: 7.62 feet above mean lower low water.

BENCH MARK 6 = Y B 17 (1920) is a standard disk set horizontally in the south end of a concrete slab, formerly the abutment for a dock, located on the northeast point of Yerba Buena Island, on the east shore of the island and directly below the south side of the San Francisco-Oakland Bay Bridge. Elevation: 12.95 feet above mean lower low water.

BENCH MARK 7 (1936) is the head of a spike imbedded in the top of the concrete abutment on the northeast point of Yerba Buena Island. The bench mark is located on the north end of the abutment at the inshore end of the United States Army dock. It is 1.2 feet south of the north end of the abutment and 1.2 feet west of the east face of the abutment. Elevation: 12.53 feet above mean lower low water.

TIDAL BENCH MARKS

Yerba Buena Island and
Treasure Island (cont'd.)

BENCH MARK 8 (1936) is a standard disk, stamped "8 1936", located on the northeast point of Yerba Buena Island. The bench mark is on the south end of the concrete abutment, at the inshore end of the United States Army Dock. It is 1.3 feet north of the south end of the abutment and 1.8 feet west of the east face of the abutment. Elevation: 12.53 feet above mean lower low water.

BENCH MARK 9 (1936) is a standard disk, stamped "9 1936", located on the northeast point of Yerba Buena Island, on the lowest step in the footing of the easternmost bridge pier of the San Francisco-Oakland Bay Bridge. The bench mark is about 200 feet west of the United States Army Dock, near the southwest corner of the concrete pier, 1.2 feet north of the south face of the footing and 6.5 feet east of the west face of the footing. Elevation: 25.03 feet above mean lower low water.

BENCH MARK 10 (1936) is the head of a spike imbedded in concrete, located on the northeast point of Yerba Buena Island, on the lowest step in the footing of the easternmost bridge pier of the San Francisco-Oakland Bay Bridge. The bench mark is about 200 feet west of the United States Army Dock and 0.3 foot northeast of the southwest corner of the concrete pier footing. Elevation: 24.99 feet above mean lower low water.

BENCH MARK WORLD (1938) is a standard triangulation station disk, stamped "WORLD 1938", set on the boulder retaining wall on the east side of Treasure Island 312 feet north of the ferry slip. Note: This bench mark appears to have settled about 0.25 foot between November 1940 and April 1942. The elevation given is based on the 1942 leveling. It was also reported in April 1942 that a new finger pier was under construction about 100 feet north of this mark. Elevation: 11.76 feet above mean lower low water.

BENCH MARK 2 (1940) is the top of a fire hydrant, stamped "199 10 M". The fire hydrant, which is about 8 inches in diameter and 3 feet high is located 6.6 feet west of the high water line and 82 feet south of the ferry slip dock where it touches the east side of Treasure Island. The stamping is in the center of the roundish head of the fire hydrant. Elevation: 14.82 feet above mean lower low water.

TIDAL BENCH MARKS

Yerba Buena Island and
Treasure Island (cont'd.)

BENCH MARK 3 (1940) is a standard disk, stamped "No. 3 1940", set in a large foundation block 8 feet wide, 75 feet long and flush with the ground located at the end of the ferry slip dock on the east side of Treasure Island. The concrete in the block is tinted red, except for a strip of white about one foot wide in the center, running the entire length. The bench mark is located 6.3 feet south of the north edge of the block, 2.8 feet west of the east edge of the block, 78.7 feet west of the high water line and 32.8 feet east of the railroad tracks. Elevation: 12.73 feet above mean lower low water.

BENCH MARK 4 (1940) is a standard disk, stamped "No. 4 1940", set in a concrete foundation in a doorway flush with the ground in an annex to the hangar known as Fine Arts Building during the Worlds Fair. The bench mark is located 161 feet westward from the south-east corner of Treasure Island and 171 feet north of the south high water line. It is 4 feet north of the south edge of the building and 6 inches west of the east side. This annex to the hangar is now (April 1942) used as a fire house. The bench mark is 69 feet south of the hangar proper. Elevation: 12.81 feet above mean lower low water.

BENCH MARK 5 (1940) is a standard disk, stamped "No. 5 1940", set in a concrete structure 15 feet square and used for ventilation of an adjacent building known as the "Administration Building". The bench mark is located at the southwest corner of Treasure Island, about 250 feet east of the high water line, about 240 feet north of the south high water line, $4\frac{1}{2}$ feet south of a retaining wall, $2\frac{1}{2}$ feet east of the west side of the ventilator and 49 feet west of the east face of the Administration Building. An inclined runway passes just to the south of the bench mark and leads to the garages under the building. Elevation: 13.80 feet above mean lower low water.

BENCH MARK 6 (1942) is the top of a fire hydrant, stamped "205-12M" in the top of the roundish head, located on the east side of Treasure Island, northwest of the ferry slip, about 16 feet east of the center line of the double railroad track which runs to the ferry slip, about 32 feet west of the westerly face of the building which is also high water line, about 19 feet southwest of the south end of the old pink-colored concrete sidewalk, with one foot wide white strip in center throughout its length, on which Bench Mark 3 is located. Elevation: 15.42 feet above mean lower low water.

TIDAL BENCH MARKS

Yerba Buena Island and
Treasure Island (cont'd.)

BENCH MARK 7 (1942) is the top of the rounded part of a fire hydrant, stamped "170-10M", located on the east side of Treasure Island, at the southeast corner of the paved airfield runway, about 65 feet west of the center line of the railroad tracks which run from the ferry slip and turns to the northwest, about 9 feet west of a partially covered railroad track, about 220 feet west of the high water line and about 108 feet southeast of the project center line of the new finger wharf under construction (April 1942). Elevation: 14.92 feet above mean lower low water.

BENCH MARK 8 (1942) is the top of the rounded part of a fire hydrant, stamped "182-10M", on the northwest side of Treasure Island, about 210 feet southeast of the Magnetic Range Building and small dock, about 53 feet east of the high water line and 19 feet east of the center line of paved road that runs along the west side of Treasure Island. Elevation: 13.10 feet above mean lower low water.

BENCH MARK Fair No. 1 (1938) is a standard reference mark for triangulation station PARR 1938, stamped "Fair No. 1", set in the top of a large rock that is a part of the retaining wall and about 27 feet north of the most westerly corner of Treasure Island. Elevation: 9.95 feet above mean lower low water.

BENCH MARK Fair No. 2 (1938) is a standard reference mark for triangulation station PARR 1938, stamped "Fair No. 2", set in the top of a large rock that is part of the retaining wall and about 62 feet southeast of the most westerly corner of Treasure Island. Elevation: 10.72 feet above mean lower low water.

The lower low water datum at Yerba Buena and Treasure Islands is based on one year of automatic tide gage records at Yerba Buena, October 1936 - September 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	6.00
Mean high water	5.40
Half tide level	3.25
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

TIDAL BENCH MARKS

Berkeley

Lat: 37°51'.9 Long: 122°18'.4

BENCH MARK 5 (1917) is a standard disk, stamped "5", set in the top of a prominent concrete sewer just west of a manhole, about 150 feet west of the west end of University Avenue and about 40 feet north of the causeway leading to the Berkeley-San Francisco automobile ferry. Elevation: 8.89 feet above mean lower low water.

BENCH MARK 7 (1920) is a standard hydrographic station disk, stamped "Bench Mark", set in the concrete slab at the southwest corner of a large oil tank owned by the El Dorado Oil Works, at the northeast corner of University Avenue and Second Street. The disk is about 5 feet north and 5 feet east of a fence around a tank and is flush with the ground. Elevation: 12.19 feet above mean lower low water.

BENCH MARK 8 (1932) is the top of a projecting $\frac{1}{2}$ -inch iron bolt in the top of the east side of an old "L"-shaped concrete foundation which is about 1.8 feet above the ground and located at the northwest corner of University Avenue and Second Street, 14.5 feet west of the west curb of Second Street and 6.2 feet north of the north edge of University Avenue pavement. Elevation: 13.57 feet above mean lower low water.

BENCH MARK 9 (1932) is a standard disk, stamped "9 1932", set horizontally in the top of the south corner of the concrete footing of the steel support of the water tank of the El Dorado Oil Works, at the northwest corner of Third Street and University Avenue. It is 4 feet north of the south fence and about 2 feet above the ground. Elevation: 17.25 feet above mean lower low water.

The lower low water datum at Berkeley is based on 6 months of automatic tide gage records, September 1932 - March 1933, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	5.90
Mean high water	5.30
Half tide level	3.20
Sea-level datum of 1929 ...	3.01
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

TIDAL BENCH MARKS

Point Isabel

Lat: 37°53'. 9 Long: 122°19'. 4

BENCH MARK 1 (1932) is a standard disk, stamped "B.M. 1 1932", set in the center of the top of an old concrete foundation block, 3 feet by $1\frac{1}{2}$ feet by 2 feet, 105 feet east of the shore end of the trestle to the wharf at the northwest point of Point Isabel and 30 feet south of the narrow gage railroad track. Elevation: 21.51 feet above mean lower low water.

BENCH MARK 2 (1932) is a standard disk, stamped "B.M. 2 1932", set in the top of a concrete post projecting $\frac{1}{2}$ foot above the ground, 720 feet north of a railroad crossing called "Vigorit", (Central Avenue), 25 feet east of the east railroad track, 3 feet west of the right-of-way fence and 3 feet above the level of the railroad bed. Elevation: 15.31 feet above mean lower low water.

BENCH MARK 3 (1932) is a standard disk, stamped "B.M. 3 1932", set in the center of the south side of 9-foot by 10-foot concrete "Stege" sewer manhole, 2 feet above the surface of the ground, at the east end of Point Isabel, 90 feet east of a red barn and 12 feet south of the railroad track. Elevation: 9.77 feet above mean lower low water.

BENCH MARK B.W.F. 9 A (1930-1932), established by the Berkeley Water Front Company, is the southwest corner of a concrete manhole at the junction of Central Avenue and main sewer, 4 inches from the corner. Elevation: 9.77 feet above mean lower low water.

BENCH MARK B.W.F. 9 B (1930-1932), established by the Berkeley Water Front Company, is the top of a $\frac{3}{8}$ -inch brass plug, stamped "4", set in a concrete-filled 8-inch casing, on the north point of Point Isabel, the first prominent point about 300 feet east of wharf and about 25 feet south of a high water mark. Elevation: 13.01 feet above mean lower low water.

The lower low water datum at Point Isabel is based on 4 months of automatic tide gage records, March-June 1932, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	5.90
Mean high water	5.30
Half tide level	3.20
Sea-level datum of 1929 ...	2.90
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

TIDAL BENCH MARKS

Richmond (Inner Harbor)

Lat: 37°54' 6 Long: 122°21' 4

BENCH MARK 1 (1932) is a standard disk, stamped "B.M. 1 1932", set in the south corner of the southeast concrete footing of the water tank at the Ford Motor Company Plant. Elevation: 17.21 feet above mean lower low water.

BENCH MARK 2 (1932) is a standard disk, stamped "B.M. 2 1932", set vertically in the granite facing or water table at the first inset south of the main entrance to the office in the assembly building of the Ford Motor Company Plant, on Tenth Street. Elevation: 16.83 feet above mean lower low water.

BENCH MARK 3 (1932) is a standard disk, stamped "B.M. 3 1932", set in the platform at the south end of Parr-Richmond Terminal 3, east of the wheel guard on the east side of the entrance. The bench mark is on the end of the terminal facing Scott Avenue and is about 300 feet west of South Tenth Street. Elevation: 14.21 feet above mean lower low water.

BENCH MARK 4 (1932) is the center of a 10-inch square brass plate set on a concrete post on the east side of the south entrance to the oil house of the Ford Motor Company Plant and is inscribed as follows:

"BASED ON RICHMOND CITY DATUM. THIS LEVEL IS 16.0
USED ON PLANS BY ALBERT KAHN INC. ARCHITECTS AND
SURVEY BY THE CITY ENGINEER OF RICHMOND, CALIFORNIA."

Elevation: 16.67 feet above mean lower low water.

BENCH MARK "A" (1932) is the top of the north wheel guard at the north double door at the east end of wharf shed near the tide gage location (of 1932) and west of Bench Mark 4. Note: This bench mark is subject to being struck by wheels of passing trucks. Elevation: 17.85 feet above mean lower low water.

BENCH MARK "FORD" (1932) is the top of a brass cap screwed on a galvanized iron pipe set vertically in concrete located on the east property line of the Ford Motor Company, about 50 feet from the edge of a fill and directly under a wire fence. It constitutes a boundary mark of the Ford property. Elevation: 15.72 feet above mean lower low water.

TIDAL BENCH MARKS

Richmond

(Inner Harbor) (cont'd.)

BENCH MARK "GATE" (1932) is a boundary marker similar to Bench Mark "FORD" at the east side of the gate into the Ford Motor Company property at the end of Tenth Street. It is at the edge of the sidewalk and in the cement foundation of the first fence post from the gate. Elevation: 15.60 feet above mean lower low water.

The lower low water datum at Richmond (Inner Harbor) is based on 22 months of automatic tide gage records, October 1931 - July 1933, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	5.80
Mean high water	5.20
Half tide level	3.15
Sea-level datum of 1929 ...	2.96
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Point Richmond (Standard Oil Company Dock)

Lat: 37°55'.7 Long: 122°24'.0

BENCH MARK 1 (1917) is a standard disk, stamped "1 1917", set in the southwest corner of a pump house on a concrete foundation. The pumping plant is located on the east side of the Standard Oil Company dock. Elevation: 12.89 feet above mean lower low water.

BENCH MARK 2 (1917) is a standard disk, stamped "2 1917", located at the foot of a square brick chimney at the southwest corner of a brick powerhouse west of the wharf landing and bears west-northwest (true) 112 feet from Bench Mark 1. Elevation: 12.88 feet above mean lower low water.

BENCH MARK 3 (1934) is a standard disk set in the top of the west side of a hexagonal concrete pipe protector at the outer end of a fill on the east side of the Standard Oil Company dock. The concrete protector surrounds two main large pipe lines over a fill at a point where they enter the bay. Elevation: 9.73 feet above mean lower low water.

TIDAL BENCH MARKS

Point Richmond
(Standard Oil Company Dock) (cont'd.)

BENCH MARK 4 (1934) is a standard disk, stamped "4 1934", set in the top of the west end of a concrete pipe underpass wall on the north side of the highway between the Standard Oil Refinery and the San Rafael Ferry. The pipe underpass is a few yards west of a road fork to the Standard Oil Company dock. Elevation: 40.35 feet above mean lower low water.

The lower low water datum at Point Richmond (Standard Oil Company Dock) is based on 3 months of automatic tide gage records, October - December 1934, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	<u>Feet</u>
Highest tide (estimated) ..	8.5
Higher high water	5.90
Mean high water	5.30
Half tide level	3.20
Sea-level datum of 1929 ...	3.03
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Point Orient and Point San Pablo
Lat: 37°57'.4 Long: 122°25'.4

BENCH MARK 1 (1932) is a standard disk, stamped "BM 1 1931", set in the top of the first concrete support for pipe lines on the north side of the Standard Oil dock at Point Orient. It is between the two offshore pipes about 25 yards north of the shore end of the dock. Elevation: 11.89 feet above mean lower low water. Note: The elevation of this mark is based on levels of December 1941. The bench mark appears to have settled about 0.15 foot since its establishment.

BENCH MARK 2 (1932) is a standard disk, stamped "BM II 1931", set in the top of the south end of a concrete sea wall about 80 yards north of the Standard Oil Company dock at Point Orient. The road turns east across the railroad tracks at this point. Elevation: 14.08 feet above mean lower low water.

TIDAL BENCH MARKS

Point Orient and
Point San Pablo (cont'd.)

BENCH MARK 139 + 11.22 (E.B.M.U.D.) is an East Bay Municipal Utilities District 2 $\frac{1}{2}$ -inch standard disk, stamped "139 + 11.22", fastened in the top of a 4-inch concrete-filled pipe set in concrete and projecting 4 inches above the ground, about 550 feet east of the Standard Oil Company dock at Point Orient, 46 feet east of railroad crossing sign 34. 4.83, 26 feet north of the center of a belt line railroad track and 12 feet west of the center line of a private road. Elevation: 26.74 feet above mean lower low water.

BENCH MARK 141 + 08.20 (E.B.M.U.D.) is a standard disk of the East Bay Municipal Utilities District, stamped "STA. 141 + 08.20", approximately 165 yards east of the shore end of the Standard Oil Company dock at Point Orient, about 5 feet northeast of the northeast rail and approximately 19 feet southwest of the south corner of a building. Elevation: 21.04 feet above mean lower low water.

BENCH MARK 143 + 33.40 (E.B.M.U.D.) is a standard disk of the East Bay Municipal Utilities District, stamped "STA. 143 + 33.40", set in concrete in an iron pipe approximately 295 feet east of the shore end of the Standard Oil Company dock at Point Orient, approximately 150 feet west of the west end of a building, at the base of a steep bank about 25 feet high and about 3 feet northeast of the northeast rail. Elevation: 19.38 feet above mean lower low water.

BENCH MARK 2 (San Pablo 1917) is a standard disk, set vertically, stamped "San Pablo BM 2 1917", at Point San Pablo, in the bight east of and below the Pacific Molasses Company storage tanks, at a red brick building, 22 inches west of the southeast corner of the concrete foundation and 5 feet below the first brick course. Elevation: 7.27 feet above mean lower low water.

The lower low water datum at Point Orient and Point San Pablo is based on 6 months of automatic tide gage records at Point Orient, February - August 1930, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	5.80
Mean high water	5.20
Half tide level	3.15
Sea-level datum of 1929 ...	2.85
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

TIDAL BENCH MARKS

Pinole Point, San Pablo Bay
Lat: 38°00' 8 Long: 122°21' 8

BENCH MARK 1 (1931) is a standard disk, stamped "B.M. 1 1931", set in the concrete base of the retaining wall supporting parapets around an explosive loading house. It is on the northeast point of the concrete in the vicinity of the building and about 300 feet south of the Giant Powder Company Dock. Elevation: 26.80 feet above mean lower low water.

BENCH MARK 2 (1931) is a standard disk, stamped "B.M. 2 1931", set in the concrete base on the northwest side of the explosive loading house. It is in the western end of the same piece of concrete as bench Mark 1 and 70 yards west of it. Elevation: 26.39 feet above mean lower low water.

BENCH MARK 3 (1931) is a standard disk, stamped "B.M. 3 1931", set in the concrete base of the parapet on the northwest side of an explosive loading house. It is about 400 feet southeast of the dock of the Giant Powder Company and 300 feet east of Bench Mark 1. Elevation: 22.37 feet above mean lower low water.

The lower low water datum at Pinole Point is based on five months of automatic tide gage records, May 1 - September 30, 1930, reduced to mean values. The elevations of other tide planes at Pinole Point referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	6.10
Mean high water	5.50
Half tide level	3.30
Sea-level datum of 1929 ...	2.99
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Hercules, Refugio Landing, San Pablo Bay
Lat: 38°01' 4 Long: 122°17' 5

BENCH MARK 1 (1921) is a standard disk, stamped "1 1921", set in the top of a concrete pier 2 by 3 feet in size at the top and 23 inches high, southwest of the Hercules Powder Company powerhouse, 60 feet north of the trestle carrying a narrow gage railway to the dock and 29 feet southwest of a small bridge carrying a narrow gage railway spur track over a stream. Elevation: 12.55 feet above mean lower low water.

TIDAL BENCH MARKS

Hercules, Refugio Landing,
San Pablo Bay (cont'd.)

BENCH MARK 2 (1921) is a standard disk, stamped "2 1921", set in the top of an 8-inch drain pipe filled with concrete projecting 6 inches, near the west end of the Hercules Powder Company dock, 6 feet west of the first iron fire hydrant on solid ground and 26 feet south of fire alarm box 117. Elevation: 10.89 feet above mean lower low water.

BENCH MARK 3 (1921) is a standard disk, stamped "3 1921", on the north side of the Hercules Powder Company dock, in the top of the concrete coating of the 22d pile from the inshore end of the dock. Elevation: 6.69 feet above mean lower low water.

BENCH MARK 4 (1921) is a standard disk, stamped "4 1921", set in the top of the concrete foundation at the southwest corner of the power plant building of the Hercules Powder Company, $2\frac{1}{2}$ feet above the ground. Elevations: 14.40 feet above mean lower low water.

BENCH MARK 5 (1936) is a standard disk, stamped "5 1936", located on the southeast side of the Southern Pacific Railroad tracks, and $1\frac{1}{5}$ mile southwest of the Hercules railroad station. The bench mark is located on the northeast corner of the concrete base for the semaphore bridge marked "234". Elevation: 11.97 feet above mean lower low water.

The lower low water datum at Hercules, Refugio Landing, San Pablo Bay, is based on 3 months of automatic tide gage records, December 1936 - February 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.0
Higher high water	6.00
Mean high water	5.50
Half tide level	3.30
Sea-level datum of 1929 ...	2.89
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

TIDAL BENCH MARKS

Selby, Carquinez Strait
Lat: 38°03' 5 Long: 122°14' 6

BENCH MARK 1 (1932) is a standard disk, stamped "BM 1 1931", near the dock of the American Smelting and Refining Company, about 100 feet southeast of the north end of the dock, 35 feet southeast of the northeast corner of the weighing shed, 5 feet north and 5 feet west of the northeast corner of an ore storage shed, in a concrete curb around a power transmission pole and 6 inches higher than the ground. Elevation: 12.26 feet above mean lower low water.

BENCH MARK 2 (1932) is a standard disk, stamped "BM 2 1931", at the wharf scale house of the American Smelting and Refining Company, under the southeast corner of the building and in the top of a concrete footing of a metal pole supporting a pipe line. Elevation: 12.07 feet above mean lower low water.

BENCH MARK 3 is a United States Engineers triangulation station disk, stamped "F", set in a concrete block 16 inches by 16 inches and projecting 2 inches above the ground, 38 feet south of the foundation of dismantled weighing station No. 189 and east of three large storage tanks of the American Smelting and Refining Company. Elevation: 11.16 feet above mean lower low water.

The lower low water datum at Selby, Carquinez Strait, is based on 7 months of automatic tide gage records, April 1 - November 30, 1930, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	<u>8.0</u>
Higher high water	6.00
Mean high water	5.50
Half tide level	3.25
Sea-level datum of 1929 ...	2.85
Mean low water	1.00
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

Crockett, Carquinez Strait
Lat: 38°03' 4 Long: 122°13' 1

BENCH MARK 1 (1886) is a chiseled cross on an iron bolt set vertically in the north face of the oil storage house of the California and Hawaiian Sugar Refinery Company, about 9 feet west of the door, midway between the first and second windows and on a level with the window ledges. Elevation: 14.43 feet above mean lower low water.

TIDAL BENCH MARKS

Crockett,
Carquinez Strait (cont'd.)

BENCH MARK 2 (1922) is a standard disk, stamped "2 1929", set vertically in the south face of the old shop building about 50 feet north of the entrance to the grounds of the California and Hawaiian Sugar Refinery Company, 5 feet east of the entrance to the passageway through the building and $1\frac{1}{2}$ feet higher than the ground. Elevation: 13.49 feet above mean lower low water.

BENCH MARK 3 (1922) is a nail head in the top of a concrete post, along the outside of the south wall of the California and Hawaiian Sugar Refinery Company. 51 feet east of the gate in the wall, 3 feet west of the fourth post east of the gate, 7 feet north of the Southern Pacific Railroad Company siding and about 3 inches higher than the ground. Elevation: 13.51 feet above mean lower low water.

BENCH MARK 4 is a brass disk, one inch in diameter, stamped "4", set in the top of a concrete post 6 inches in diameter, which is level with the road surface and imbedded in a concrete patch 3 feet in diameter. It is located on the south side of Pomona Street, 15 feet north of the east side of the gateway to the Carquinez Grammar School, about 240 feet west of Rolph Avenue. Elevation: 63.24 feet above mean lower low water.

BENCH MARK 5 (1936) is a standard disk, stamped "5 1936", set in the top, and 3 feet west of the east end, of a concrete retaining wall, at the southeast corner of Pomona Street and First Avenue and 2 feet above the street level. Elevation: 65.35 feet above mean lower low water.

BENCH MARK F (C.&H.), established by the California and Hawaiian Sugar Refinery Company, is a brass disk, one inch in diameter, stamped "C. & H. F.", set in a concrete post 6 inches in diameter and imbedded in a mass of concrete on the west side of Rolph Avenue, about 240 feet north of Pomona Street, on the north side of an alleyway leading to the rear of John Swett Union High School. Elevation: 46.72 feet above mean lower low water.

BENCH MARK 118.9 (U.S.G.S.), established by the United States Geological Survey, is a copper rivet, stamped "U.S.G.S. B.M. CAL", set in the top of a concrete wall on the west side of the south end of the highway bridge over Carquinez Strait, about $\frac{1}{4}$ mile west of Crockett. The bench mark is at the south end of the sidewalk. Elevation: 121.72 feet above mean lower low water.

TIDAL BENCH MARKS

Crockett,
Carquinez Strait (cont'd.)

BENCH MARK 31 (U.S.E.), established by the Corps of Engineers, United States Army, is a triangulation station cap, stamped "Harbor N Mon. No. 31", riveted on the top of a $3\frac{1}{2}$ -inch iron pipe, about 0.3 mile east along the Southern Pacific Railroad Company from the station at Crockett, between four railroad tracks, about one foot north of the flagstones in the center of the right-of-way and level with the ground. Elevation: 13.17 feet above mean lower low water.

BENCH MARK V 129, located about 0.6 mile southeast along the State Highway from the post office at Crockett, is a standard disk, stamped "V 129 1932 117.936", set vertically in the face of the top block of concrete at the east end of the north wall of the Bell Telephone Company building at the southwest corner of the intersection of the highway and Atherton Avenue, on the east side of the doorway and about $3\frac{1}{2}$ feet higher than the sidewalk. Elevation: 120.79 feet above mean lower low water.

The lower low water datum at Crockett is based on 2 months of automatic tide gage records, November 1 - December 31, 1929, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.0
Higher high water	5.90
Mean high water	5.40
Half tide level	3.20
Sea-level datum of 1929 ...	2.85
Mean low water	1.00
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

Suisun Point and Vicinity, Suisun Bay
Lat: 38°02'.3 Long: 122°06'.9

BENCH MARK 1 (1922) is a standard disk, stamped "1", set in the top of a 6-inch pipe filled with concrete. The top of the pipe is flush with the ground. The bench mark is located 114 feet from the inner end of the Mococo dock (in ruins), 27 feet east of the projection of the center line of the straight approach to the dock and about 7 feet southwest of the center line of the track running onto the dock. Elevation: 13.89 feet above mean lower low water.

TIDAL BENCH MARKS

Suisun Point and Vicinity,
Suisun Bay (cont'd.)

BENCH MARK 4 (1922) is a standard disk, stamped "4", set in the top of the retaining wall running north from the smelter building on the property of the Mountain Copper Company, about 6 feet from the building. Elevation: 23.69 feet above mean lower low water.

BENCH MARK 2 (1922) is a standard disk, stamped "2", set in the northeast corner of the concrete foundation under a steel column at the northeast corner of the smelting building. The bench mark is about 21 inches above the ground. Elevation: 18.61 feet above mean lower low water.

BENCH MARK 3 (1922) is a standard disk, stamped "3", set in the top of a vitrified pipe filled with concrete, the top of the pipe being flush with the ground. The bench mark is on the property of the Mountain Copper Company, between warehouse No. 8 and the railroad tracks, 2 feet from the warehouse and 5 feet from the northeast corner. Elevation: 16.83 feet above mean lower low water.

BENCH MARK 5 (1937) is a standard disk, stamped "Tidal 5 1937", cemented horizontally in the top of the concrete foundation on the east foundation of Pier 3 (near the south end) of the Southern Pacific Martinez-Benicia Drawbridge. It is close to the southeast corner. The location is reached by going by road to the plant of the Mountain Copper Company, then on foot to the shore ($\frac{1}{4}$ mile), then along the shore to the bridge. Pier 3 is surrounded by water at high tide and is about 20 feet from the high water line. It may be easily reached at any stage of the tide by climbing onto Pier 2 and walking along the structure. Elevation: 10.67 feet above mean lower low water.

BENCH MARK 27 (U.S.G.S.) is a United States Geological Survey standard disk, stamped "27", at the west entrance to the County Courthouse at Martinez, on the north side of the steps, about $2\frac{1}{2}$ feet in from the lower step and one foot above the ground. Elevation: 25.71 feet above mean lower low water.

The lower low water datum at Suisun Point is based on 2 months of automatic tide gage records, May 21 - July 21, 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

TIDAL BENCH MARKS

Suisun Point and Vicinity,
Suisun Bay (cont'd.)

	Feet
Highest tide (estimated) ..	8.0
Higher high water	5.60
Mean high water	5.10
Half tide level	3.05
Sea-level datum of 1929 ...	2.39
Mean low water	1.00
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

Bay Point, Suisun Bay
Lat: 38°03'. 5 Long: 122°01'. 6

BENCH MARK 4 (U.S.E.), established by the U. S. Engineers, is a metal tablet, stamped "U.S.E.D.", set in the top of a concrete post, approximately 190 yards east of a wooden water tank at the Point Edith Fisheries, about 43 feet south of the high water line on top of a grass-covered dike and approximately 66 feet west of the center line of the railroad tracks on the wooden dock. Elevation: 16.27 feet above mean lower low water.

BENCH MARK 5 (1922) is a standard disk, stamped "No. 5 1922", set in concrete in a 10-inch sewer pipe set flush with the ground, 5 feet northwest of the northeast corner of the concrete foundation of a burned building, about 110 yards east of a wooden water tank, 50 feet south of the high water line and 6 feet southwest of the southwest corner of the dike. Elevation: 13.34 feet above mean lower low water.

BENCH MARK 6 (1922) is a standard disk, stamped "No. 6 1922", set in the vertical face of a concrete wall and located 3 feet west of the northeast corner of a concrete storage tank. The bench mark is about 270 yards east of a wooden water tank at the dock, about 33 feet southwest of the railroad crossing and 3 feet above ground. Elevation: 15.28 feet above mean lower low water.

BENCH MARK 1 (1932) is a standard disk, stamped "B.M. 1 1931", set in the northwest corner of the footing of the northwest leg of the Coos Bay Lumber Company water tank. Elevation: 13.36 feet above mean lower low water.

BENCH MARK 2 (1932) is a standard disk, stamped "B.M. 2 1931", set in the east end of the footing supporting the southeast leg of the Coos Bay Lumber Company water tank. Elevation: 13.38 feet above mean lower low water.

TIDAL BENCH MARKS

Bay Point,
Suisun Bay (cont'd.)

BENCH MARK 3 (1932) is a standard disk, stamped "B.M. 3 1931", set in the east side of the concrete dead man supporting the north guys to the smoke stack of a powerhouse of the Coos Bay Lumber Company. The bench mark is about 40 yards north of the powerhouse. Elevation: 12.67 feet above mean lower low water.

BENCH MARK 3 (1915) is the head of a galvanized spike driven horizontally into the middle of the east end of the south big sill of the electric crane of the dock of the Smith Lumber Company at Bay Point. The sill is about $1\frac{1}{2}$ feet square. Tacks are driven to form a cross about the head of the spike. Elevation: 11.25 feet above mean lower low water.

BENCH MARK B 8 (1930) is a United States Geological Survey disk, stamped "B 8 1930", set in a concrete monument 8 inches in diameter and projecting 10 inches above the ground and located about 10 feet east of overhead railroad bridge and on the south side of the main highway at the west side of the Coos Bay Lumber Company at Bay Point. Elevation: 7.21 feet above mean lower low water.

BENCH MARK 9 (1940) is a standard disk, stamped "No. 9 1940", set in a concrete slab located at Point Edith Fisheries, approximately 135 yards southeast of a wooden water tank, about 33 feet south of the center line of a paved road, about 16 feet east of the northwest corner of a large wooden building and about 5 feet north of the north side of the same building. The bench mark is in the southeast corner of a large concrete platform. Elevation: 12.88 feet above mean lower low water.

The lower low water datum at Bay Point is based on 4 months of automatic tide gage records, April - September 1930 and 94 high waters and 93 low waters, April 1 - May 19, 1937, the results from both series being reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.0
Higher high water	5.30
Mean high water	4.80
Half tide level	2.80
Sea-level datum of 1929 ...	2.03
Mean low water	0.80
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

TIDAL BENCH MARKS

Mallard Ferry Wharf, Mallard Island, Suisun Bay
Lat: 38°02'. 6 Long: 121°55'. 2

BENCH MARK 1 (1932) is a standard disk, stamped "B.M. 1 1932", set in base of standpipe about 80 yards southwest of the California Water Service Company pump house. It is in the northeast corner of the base on a level with the walk. Elevation: 9.95 feet above mean lower low water.

BENCH MARK 2 (1932) is a standard disk, stamped "B.M. 2 1932", set in a concrete joint at the turn in pipe line on the west side of road about 150 yards southwest of pump house. It is in the northwest corner of concrete structure. Elevation: 7.65 feet above mean lower low water.

BENCH MARK 3 (1932) is a standard disk, stamped "B.M. 3 1932", set in the northwest corner of a concrete culvert for water intake on the east side of walkway and 100 yards southwest of pump house. It is about 15 feet east of the walkway. Elevation: 5.91 feet above mean lower low water.

BENCH MARK 1 (1941) is a standard disk, stamped "No. 1 1941", set in $1\frac{1}{2}$ -inch pipe, about 300 yards southeast of the end of Mallard Ferry Wharf, 9 feet east of center line of railroad track, 27 feet southeast of railroad switch, 2 feet southwest of southwest corner of railroad section car house and 15 feet south of trestle. Elevation: 8.49 feet above mean lower low water.

BENCH MARK 2 (1941) is a standard disk, stamped "No. 2 1941", set in $1\frac{1}{2}$ -inch pipe 90 yards east of spur switch, 31 feet north of south main track, 17 feet northeast of section building West Pittsburg and $11\frac{1}{2}$ feet south of north spur track. Elevation: 4.89 feet above mean lower low water.

The lower low water datum at Mallard Ferry Wharf is based on 2 months of automatic tide gage records for the months of November 1941 and January 1942, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	7.0
Higher high water	4.70
Mean high water	4.20
Half tide level	2.45
Mean low water	0.70
Lower low water datum	0.00
Lowest tide (estimated) ...	-1.5

TIDAL BENCH MARKS

Pittsburg, Suisun Bay
Lat: 38°02'.1 Long: 121°52'.8

BENCH MARK 1 (1923) is a standard disk, stamped "1 1923", set in the top of west retaining wall back of the City Hall at Eighth Street and Railroad Avenue. The wall is concrete and the bench mark is located about $13\frac{1}{2}$ feet north of the building itself. Elevation: 23.27 feet above mean lower low water.

BENCH MARK 3 (1923) is the letter "W" on the sewer inlet set in the corner of the curb near the Bank of America, at the southwest corner of Fourth Street and Railroad Avenue. Elevation: 19.89 feet above mean lower low water.

BENCH MARK 4 (1937) is a standard disk, stamped "TIDAL 4 1937", set in the top step of a flight of steps leading to basement door. It is cemented in the concrete about four inches from the side of the building, located on Fifth Street between Railroad Avenue and Cumberland Avenue, on the north side of the Pittsburg Post Office building. Elevation: 23.73 feet above mean lower low water.

BENCH MARK 5 (1937) is a standard disk, stamped "TIDAL 5 1937", set vertically in the concrete foundation of the F. E. Booth Company warehouse, between two basement windows. The bench mark is located at the northwest corner of Second Street and Cumberland Avenue, 15 feet north of the corner. Elevation: 14.40 feet above mean lower low water.

BENCH MARK 21 (U.S.G.S.) is a United States Geological Survey bench mark, stamped "21", set in an iron pipe which stands about 4 inches above the ground. The pipe is located in the northwest corner of the old primary school yard at Fifth Street and Cumberland Avenue, near the rear of the American Trust Company. The top of the bench mark has been dented. Elevation: 22.12 feet above mean lower low water.

The lower low water datum at Pittsburg is based on 116 high waters and 116 low waters, July 22 - September 20, 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	<u>7.0</u>
Higher high water	4.50
Mean high water	4.00
Half tide level	2.75
Mean low water	0.70
Lower low water datum	0.00
Lowest tide (estimated) ...	-1.5

TIDAL BENCH MARKS

Antioch, San Joaquin River
Lat: 38°01'.1 Long: 121°48'.9

BENCH MARK 1 (1932) is a standard disk, stamped "1 1932", set in a concrete base on the north side of the concrete wall of the filtering tank at the Antioch Water Works. It is about 6 inches from the westerly of two vertical "I" beam supports. Elevation: 10.78 feet above mean lower low water.

BENCH MARK 2 (1932) is a standard disk, stamped "2 1932", set in the west side of the concrete base of the middle of three oil standpipes of the Shell Oil Company distributing plant. It is about 100 yards east of the Antioch Water Works. Elevation: 12.14 feet above mean lower low water.

BENCH MARK 21 (U.S.G.S.), established by the United States Geological Survey, is the top and inner edge of an "I" beam at the northeast corner of filtering tank of Antioch Water Works. The bench mark is about 2 feet above the ground and $1\frac{1}{2}$ inches from the corner of concrete. Elevation: 14.93 feet above mean lower low water.

BENCH MARK R 9 (1930) is a United States Geological Survey standard disk set in top of concrete semaphore base No. 537, north of the tracks and about 950 feet east of the railroad station at Antioch. Elevation: 46.17 feet above mean lower low water.

BENCH MARK 184 S is a standard United States Engineer Department disk, stamped "184 S", set in the top of a concrete post, one foot square, located on the right-of-way of the Atchison, Topeka & Santa Fe Railway and 3,200 feet east of the Antioch railroad station. The bench mark is located at the east end of a trestle, marked "B-1152", and is on the north side of the tracks. A white-painted post 2 feet west of the bench mark is inscribed "USED 2 S". Elevation: 11.65 feet above mean lower low water.

BENCH MARK 181 S is a standard United States Engineer Department disk, stamped "181 S", set in the top of a concrete post, one foot square, located on the west side at the north end of E Street on the south side of the Atchison, Topeka & Santa Fe Railway tracks. A white-painted post 2 feet west of the bench mark is inscribed "USED 2 E". Elevation: 8.73 feet above mean lower low water.

BENCH MARK 3 (1936) is a standard disk, stamped "3 1936", set in the concrete base of a semaphore on the south side of the Atchison, Topeka & Santa Fe Railway, located on the west side of Eye Street about 70 feet north of First Street. Elevation: 11.98 feet above mean lower low water.

TIDAL BENCH MARKS

Antioch,
San Joaquin River (cont'd.)

BENCH MARK 4 (1936) is a standard disk, stamped "4 1936", set vertically in the face of a concrete retaining wall, about 3 feet above the level of the railroad tracks. The bench mark is located on the north side of First Street and about 30 feet east of H Street. Elevations 13.28 feet above mean lower low water.

BENCH MARK 5 (1936) is a standard disk, stamped "5 1936", set vertically one foot above the sidewalk in the south wall of the City Hall, near the southeast corner of the building. The bench mark is located near the northwest corner of Third and H Streets. Elevations 26.91 feet above mean lower low water.

BENCH MARK 6 (1942) is a standard disk, stamped "BM No. 6 1942", set in the northeast corner of a concrete foundation for a trestle used for loading sand and gravel, about 1 mile east of Antioch. The bench mark is about 55 feet southeast of the southeast corner of the fence around the Shell Oil Company yard, about 131 feet west of the west end of a long row of sand dunes, about 213 feet south of the south bank of the San Joaquin River, about 229 feet east-southeast of Bench Mark 2 and about 220 yards north of the Santa Fe Railroad tracks. Elevation: 17.47 feet above mean lower low water.

The lower low water datum at Antioch is based on one year of automatic tide gage records, November 1, 1936 - October 31, 1937. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	6.5
Higher high water	4.20
Mean high water	3.70
Half tide level	2.15
Sea-level datum of 1929 ...	1.12
Mean low water	0.60
Lower low water datum	0.00
Lowest tide (estimated) ...	-1.5

TIDAL BENCH MARKS

Collinsville, Sacramento River
Lat: 38°04'. 4 Long: 121°51'. 0

BENCH MARK 2 (1936) is a standard disk, stamped "2 1936", set in the top of a square concrete post, $4\frac{1}{2}$ feet deep located near the north end of Collinsville, on the west side of the main street and in line with some power line poles. It is about 470 yards south of the schoolhouse grounds, about 60 yards north of the small building used as a post office, 8 yards north of a power line pole and opposite an old yellow house. Note: This bench mark should be used with extreme caution as levels of 1936, 1937, 1939 and 1940 show definitely that it has settled over 6 inches since it was established in 1936. Elevation: 6.59 feet above mean lower low water.

BENCH MARK 3 (1936) is a standard disk, stamped "3 1936", set in the top of a square concrete post, $4\frac{1}{2}$ feet deep. The bench mark is located about $\frac{1}{2}$ mile north of Collinsville, on the west side of the main highway (County Road No. 68) and near the north boundary of the Episcopal Church property. It is on the property of the Baby Beef Company, in the southeast corner of a field. Note: This bench mark should be used with caution as levels of 1936, 1937, 1939 and 1940 show that it has settled over 0.15 foot since it was established in 1936. Elevation: 20.59 feet above mean lower low water.

BENCH MARK 4 (1936) is a standard disk, stamped "4 1936", set in the southeast corner of the concrete foundation supporting molasses storage tanks on the property of the Baby Beef Company, located about $\frac{1}{2}$ mile northwest of Collinsville. Elevation: 10.69 feet above mean lower low water.

BENCH MARK 5 (1936) is a standard disk, stamped "5 1936", set vertically near the northeast corner in the north face of the hay shredding machine house on the property of the Baby Beef Company, located about $\frac{1}{2}$ mile northwest of Collinsville. Elevation: 13.47 feet above mean lower low water.

BENCH MARK 5 B (1906), established by the United States Geological Survey, is a standard cap, stamped "5 B 1906", set in top of a 4-inch iron pipe located about $\frac{1}{4}$ mile north of Collinsville, at the southwest corner of the schoolhouse grounds, near a road intersection. It is on the east side of the main road and about 5 feet south of a small shed. Note: It was reported in December 1939 that the bench mark was 8 inches below the surface of the ground and was covered with sand from a recent fill on the school grounds. The bench mark was recovered and connected by levels in March 1940. Elevation: 6.66 feet above mean lower low water.

TIDAL BENCH MARKS

Collinsville,
Sacramento River (cont'd.)

BENCH MARK Cattle Reference Mark No. 2 (1936) is a standard reference mark for triangulation station "CATTLE" and is located about one mile north of Collinsville at the southwest corner of the "T" intersection of the main highway and the road leading to the triangulation station (County Roads Nos. 559 and 68). It is almost directly beneath the signboard "B. B. Cattle Co.", and $\frac{1}{4}$ mile from the station in azimuth $257^{\circ}01'39"$. Elevation: 34.88 feet above mean lower low water.

BENCH MARK 6 (1939) is a standard disk, stamped "6 1939", set in the top of a 5-foot iron pipe, 2 inches in diameter, surrounded at the top by a circular concrete cap 10 inches in diameter and 10 inches deep which projects about 6 inches above the ground. The bench mark is located on the levee along the waterfront, 48 yards (paced) west of the center line of the main street, about 3 yards east of the west end of the wooden bulkhead along the levee face, and about 4 feet north of the bulkhead. Note: The stability of this mark is uncertain. The elevation should be used with caution. Elevation: 8.04 feet above mean lower low water.

BENCH MARK 7 (1939) is a standard disk, stamped "7 1939", set in the top of a 4-foot iron pipe, 2 inches in diameter, driven in the hard clay ground along the edge of the roadway. The bench mark is located 9 yards (paced) north of the wooden bulkhead of the waterfront levee and in the line of the power line poles along the west side of the main street. The top of the pipe and bench mark are enclosed in a conical concrete post 4 inches in diameter at the top and projecting about 8 inches above the ground. An irregular mass of concrete about one foot in diameter surrounds the pipe from the ground surface to a depth of about 8 inches. Note: The stability of this mark is uncertain. The elevation should be used with caution. Elevation: 5.03 feet above mean lower low water.

The lower low water datum at Collinsville is based on 1 year of automatic tide gage records, December 1936 - November 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	7.0
Higher high water	4.30
Mean high water	3.80
Half tide level	2.20
Mean low water	0.60
Lower low water datum	0.00
Lowest tide (estimated) ...	-1.5

TIDAL BENCH MARKS

Meins Landing, Montezuma Slough, Suisun Bay

Lat: $38^{\circ}08'5$ Long: $121^{\circ}54'4$

BENCH MARK 1 (1932) is a standard disk, stamped "B. M. 1 1932", set in a concrete-filled tile 10 inches in diameter, 30 inches deep, projecting 4 inches above the ground, located near the center of the west side of the warehouse about 18 yards from the dock. Elevation: 9.47 feet above mean lower low water.

BENCH MARK 2 (1932) is a standard disk, stamped "B. M. 2 1932", set in a concrete-filled tile 8 inches in diameter, 30 inches deep, projecting 6 inches above ground, located about 15 yards west of the west corner of the warehouse at Meins Landing. It is about 2 feet from a board fence. Elevation: 7.71 feet above mean lower low water.

The lower low water datum at Meins Landing is based on 5 months of automatic tide gage records, March - July 1930, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.0
Higher high water	5.90
Mean high water	5.40
Half tide level	3.15
Mean low water	0.90
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

Montezuma Slough Entrance, Suisun Bay

Lat: $38^{\circ}08'1$ Long: $122^{\circ}03'9$

BENCH MARK 1 is a standard disk set in concrete in a 10-inch tile. A stake was driven 8 feet in the ground and the tile set over it. It is about 16 feet west of the levee, about 100 feet south of where the levee turns to the southwest. Elevation: 7.44 feet above mean lower low water.

BENCH MARK 2 (1923) which is also triangulation station MONTEZUMA, is a standard triangulation station disk set in the top of a $2\frac{1}{2}$ -inch galvanized iron pipe eight feet long driven into the marshy ground, two feet of it projecting above the surface. An 8-inch tile was placed around the top of the pipe, with its top 6 inches above the ground and 18 inches below the top of pipe. The space between the pipe and tile was filled with concrete. The bench mark is about 165 feet north of where the levee turns and about 16 feet from shore. Elevation: 8.78 feet above mean lower low water.

TIDAL BENCH MARKS

Montezuma Slough Entrance,
Suisun Bay (cont'd.)

BENCH MARK 3 (1923) is a standard reference mark disk set in a six-inch tile projecting 8 inches above the surface of the ground. It is the reference mark for triangulation station MONTEZUMA and is located on the levee and directly inshore from the station (Bench Mark 2). Elevation: 7.84 feet above mean lower low water.

The lower low water datum at Montezuma Slough Entrance is based on 6 high waters and 6 low waters, January 9-12, 1923, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.0
Higher high water	6.00
Mean high water	5.50
Half tide level	3.15
Mean low water	0.80
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

Suisun Echo Board, Suisun Bay
Lat: 38°06'.8 Long: 122°03'.8

BENCH MARK 1 (1932) is a standard disk, stamped "B.M. 1 1932", set in the west side of the concrete footing of signal tower No. 399. It is approximately 415 yards west of Pierce Station on the Southern Pacific Railroad and 8 feet from the track. Elevation: 8.78 feet above mean lower low water.

BENCH MARK 2 (1932) is a standard disk, stamped "B.M. 2 1932", set in the east side of the concrete footing of signal tower No. 398. The bench mark is directly across the railroad tracks from Bench Mark 1 and about 8 feet from the track. Elevation: 9.53 feet above mean lower low water.

The lower low water datum at Suisun Echo Board is based on 3 months of automatic tide gage records, April - July 1930, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.0
Higher high water	5.60
Mean high water	5.10
Half tide level	3.00
Mean low water	0.90
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

TIDAL BENCH MARKS

Benicia (Arsenal Dock), Carquinez Strait
Lat: 38°02'.5 Long: 122°08'.0

BENCH MARK 4 (1926) is a standard disk, stamped "4 1929", set flush with the top of the northeast concrete abutment of the shore end of the Army Dock runway. The abutment is near the low water line. The bench mark is 3 feet east of the road leading down to the dock and northeast of a 15-foot bridge between the dock and the beginning of the road. Elevation: 9.65 feet above mean lower low water.

BENCH MARK "U.S.E.D. 4", is a standard triangulation station disk, stamped "No. 4", set in the top of a concrete post. The bench mark is located at Army Point, Benicia, about 600 yards west of the Southern Pacific railroad bridge across Carquinez Strait and about 30 yards south of the Southern Pacific railroad track to Benicia. The bench mark is located on a grassy point near a pump house, close to the water's edge. Elevation: 8.44 feet above mean lower low water.

BENCH MARK 5 (1926) is a standard disk, stamped "5 1929", set in the east end of the top of the railroad semaphore base at the southwest corner of the railroad and Army Dock roadbed intersection. The semaphore is about 6 feet from the south track, about 10 feet west from the center of the dock road and 3 feet north of a small sentinel house. The railroad is the main line of the Southern Pacific Railroad. Elevation: 9.39 feet above mean lower low water.

BENCH MARK 6 (1926) is a standard disk, stamped "6 1929", set in the vertical face of the northwest side of the southwest doorway of the second army storehouse (a large red brick building) directly north of the Southern Pacific Railroad and Army Dock road crossing and about 165 feet away. The disk is about one foot above the ground. There is a spur railroad track leading into the building through this door. Elevation: 15.83 feet above mean lower low water.

BENCH MARK 7 (1936) is a standard disk, stamped "7 1936", located on the grounds of the Benicia Arsenal, on the north side of the Administration Building (Building No. 47). The bench mark is located on top of a retaining wall surrounding this building and is 2 feet east of the northeast corner of the portico at the main entrance to this building. Elevation: 40.77 feet above mean lower low water.

TIDAL BENCH MARKS

Benicia (Arsenal Dock),
Carquinez Strait (cont'd.)

BENCH MARK 8 (1936) is a standard disk, stamped "8 1936", located on the grounds of the Benicia Arsenal at the Commissary Building (Building No. 52). The bench mark is located in the north wall of the building, one foot west of the northeast corner. Elevation: 45.42 feet above mean lower low water.

BENCH MARK 58 (U.S.G.S.), stamped "USGS 58.212 B.M.", is the top of an old cannon buried vertically, muzzle down, and projecting about one foot above the ground. It is located on the west side of Benicia Arsenal, at the main entrance gate, about 3 feet west of the north post. Elevation: 60.66 feet above mean lower low water.

The lower low water datum at Benicia (Arsenal Dock) is based on one year of automatic tide gage records, November 1936 - October 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.0
Higher high water	5.60
Mean high water	5.10
Half tide level	3.05
Sea-level datum of 1929 ...	2.45
Mean low water	1.00
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

Carquinez Strait Lighthouse and Vicinity
Lat: 38°04'.2 Long: 122°14'.5

BENCH MARK 1 (1936) is a standard disk, stamped "1 1936", set in the top of Dike No. 9, 500 yards along the dike from the shoreline, 20 feet south of the Lighthouse Service boathouse and near Carquinez Strait Lighthouse. Elevation: 9.76 feet above mean lower low water.

BENCH MARK 2 (1936) is a standard disk, stamped "2 1936", set in the top of Dike No. 9, midway (about 250 yards) between the shoreline and the Carquinez Strait Lighthouse and 10 feet southwest of the Lighthouse Service gateway. Note: A hole has been cut through the boardwalk to permit the holding of a rod on the bench mark. Elevation: 9.25 feet above mean lower low water.

TIDAL BENCH MARKS

Carquinez Strait Lighthouse
and Vicinity (cont'd.)

BENCH MARK 3 (1936) is a standard disk, stamped "3 1936", set in the highest part of a large rock located on the shoreline, 300 yards south of a gully and the west end of a road between the Vallejo Highway and the beach and 25 feet west of cottage No. 21, called "Davy Jones Locker". The bench mark is submerged at high tide. Elevation: 5.88 feet above mean lower low water.

BENCH MARK 11 (1936) is a standard disk, stamped "11 1936", set in the top of a concrete post 10 inches in diameter at the top, located about 0.2 mile north of the intersection of State Highway No. 29 and United States Highway No. 40, 38 feet east of the center line of the highway leading to Fourth Street in South Vallejo and 155 feet north of the telephone located at the intersection of this highway and State Highway No. 29. Elevation: 75.38 feet above mean lower low water.

BENCH MARK 12 (1936) is a standard disk, stamped "12 1936", 0.2 mile north of the intersection of State Highway No. 29 and United States Highway No. 40, in the top of the west end of a concrete culvert passing under United States Highway No. 40. Elevation: 88.81 feet above mean lower low water.

BENCH MARK 13 (1936) is a standard disk, stamped "13 1936", located on the east wing wall of the north abutment of the Carquinez highway bridge and 10 feet east of the bridge decking. Elevation: 173.41 feet above mean lower low water.

BENCH MARK 4 (1936) is a standard disk, stamped "4 1936", cemented in the top of the south end of the concrete sea wall on the property of the Sperry Flour Company at the foot of Magazine Street in South Vallejo. Elevation: 11.03 feet above mean lower low water.

BENCH MARK 5 (1936) is a standard disk, stamped "5 1936", set vertically near the northwest corner of the concrete north wall of the gate house at the main entrance to the Sperry Flour Company property, located in South Vallejo, west of Bay Street, between Cherry and Atherton Streets. Elevation: 14.43 feet above mean lower low water.

BENCH MARK U.S.E.D. is a standard United States Engineer Department disk set in the top of a concrete post which is flush with the ground, 36.5 feet northeast of the northeast corner of the Southern Pacific Railroad station at the foot of Winchester Street in South Vallejo and 20.9 feet west of the center line of the railroad track. Elevation: 12.03 feet above mean lower low water.

TIDAL BENCH MARKS

Carquinez Strait Lighthouse
and Vicinity (cont'd)

BENCH MARK 6 (1936) is a standard disk, stamped "6 1936", located on the south end of the concrete base of the southernmost storage tank on the Shell Oil Company property, near the southwest end of Chestnut Street in South Vallejo. Elevation: 11.17 feet above mean lower low water.

BENCH MARK 10 (1936) is a standard disk, stamped "10 1936", located on the concrete balustrade on the north side of the main entrance to the Grant School, in South Vallejo on the east side of Fifth Street, between Cherry and Winchester Streets. Elevation: 65.02 feet above mean lower low water.

BENCH MARK 624 (U.S.G.S.), established by the United States Geological Survey, is a copper rivet, $\frac{1}{2}$ inch in diameter, stamped "U.S.G.S-Cal.", set in the foundation of a flagpole in front of Grant School in South Vallejo, on the east side of Fifth Street, between Cherry and Winchester Streets. Elevation: 65.24 feet above mean lower low water.

The lower low water datum at Carquinez Strait Lighthouse and Vicinity is based on 11 months of automatic tide gage records, November 1, 1936 - September 30, 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated)	8.0
Higher high water	5.80
Mean high water	5.30
Half tide level	3.15
Mean low water	1.00
Lower low water datum	0.00
Lowest tide (estimated)	-2.0

Mare Island Navy Yard and Vallejo,
Mare Island Strait
Lat: 38°05' 9 Long: 122°16' 0

BENCH MARK "City of Vallejo" is a brass disk, 2 inches in diameter, with the inscription "City of Vallejo Bench Mark", cast in the metal, cemented into the curbing at the northwest corner of Maryland and Sonoma Streets in Vallejo. Elevation: 14.66 feet above mean lower low water.

TIDAL BENCH MARKS

Mare Island Navy Yard and Vallejo,
Mare Island Strait (cont'd.)

BENCH MARK 7 (Vallejo 1936) is a standard disk, stamped "7 1936", set on top of the concrete footing for a steel column. It is located on the south side of Maryland Street between Sonoma and Marin Streets in Vallejo. The bench mark is on the property of the Pacific Gas and Electric Company on the west side of the main gate to the plant. Elevation: 16.23 feet above mean lower low water.

BENCH MARK "Cross" (P.G. and E.), established by the Pacific Gas and Electric Company, is a cross cut on the top of a concrete wall, about 5 feet east of the main gate to the Pacific Gas and Electric Company plant, located on the south side of Maryland Street, between Sonoma and Marin Streets, in Vallejo. Elevation: 17.02 feet above mean lower low water.

BENCH MARK 60 (City of Vallejo) is a brass disk 2 inches in diameter with the inscription "City of Vallejo Bench Mark" cast in the metal and stamped "60", set on top of a concrete post. It is located at the southwest corner of Marin and Maryland Streets, in Vallejo. Elevation: 15.28 feet above mean lower low water.

BENCH MARK 24 (City of Vallejo) is a brass disk 2 inches in diameter, with the inscription "City of Vallejo Bench Mark", cast in the metal and stamped "24", set on top of a concrete post. It is located on the east side of Santa Clara Street about 70 yards south of Pennsylvania Street, in Vallejo. Elevation: 12.42 feet above mean lower low water.

BENCH MARK 66 (U.S.E.D.) is a standard United States Engineer Department disk, stamped "66 16.11", set in the top of a concrete post. It is located near the southwest corner of Santa Clara and Pennsylvania Streets, in Vallejo. Elevation: 15.09 feet above mean lower low water.

BENCH MARK 8 (Vallejo 1936) is a standard disk, stamped "8 1936", set vertically in a concrete retaining wall on the south side of a flight of steps. It is located near the southeast corner of York and Santa Clara Streets, in Vallejo. Elevation: 36.94 feet above mean lower low water.

BENCH MARK "City of Vallejo" is a brass disk, 2 inches in diameter, with the inscription "City of Vallejo Bench Mark" cast in the metal, set in the street curbing. It is located at the southeast corner of Branciforte and York Streets, in Vallejo. Elevation: 10.20 feet above mean lower low water.

TIDAL BENCH MARKS

Mare Island Navy Yard and Vallejo,
Mare Island Strait (cont'd.)

BENCH MARK 56 (City of Vallejo) is a brass disk, 2 inches in diameter, with the inscription "City of Vallejo Bench Mark" cast in the metal and stamped "56", set in the concrete curbing. It is located at the northwest corner of Branciforte and Georgia Streets, in Vallejo. Elevation: 10.52 feet above mean lower low water.

BENCH MARK "City of Vallejo" is a brass disk, 2 inches in diameter, with the inscription "City of Vallejo Bench Mark" cast in the metal, set in the concrete curbing. It is located at the southeast corner of Branciforte and Virginia Streets, in Vallejo. Elevation: 11.21 feet above mean lower low water.

BENCH MARK 76 (U.S.E.D) is a standard United States Engineer Department disk, stamped "76 12.68", set in the top of a concrete post. It is located near the waterfront on the west side of the San Francisco, Napa and Calistoga Electric Railroad track, between Florida and Carolina Streets, in Vallejo and at the northeast corner of a street parking space fill. Elevation: 11.94 feet above mean lower low water.

BENCH MARK 9 (Vallejo 1936) is a standard disk, stamped "9 1936", set in the southwest corner of the concrete base of the south pillar of the gateway to the Mare Island Navy Yard. The bench mark is located near the southwest corner of Tennessee and Butte Streets, in Vallejo. Elevation: 14.73 feet above mean lower low water.

BENCH MARK 9 (Mare Island 1936) is a standard disk, stamped "9 1936", set on top of a concrete bent, 5 feet below the level of the bridge roadway. It is located on the north side of Mare Island Highway Bridge, west of the bascule lift span. It is 27 feet west of the bascule lift span control room and 5 feet east of a highway safety gate. Elevation: 20.66 feet above mean lower low water.

BENCH MARK 8 (Mare Island 1936) is a standard disk, stamped "8 1936", set in the base of a concrete pole above a concrete abutment. It is located at the west end of the Mare Island concrete causeway, 195 feet west of the guard house (Building 45) located at the highway entrance to Mare Island Navy Yard. Elevation: 22.00 feet above mean lower low water.

TIDAL BENCH MARKS

Mare Island Navy Yard and Vallejo,
 Mare Island Strait (cont'd.)

BENCH MARK O (U.S.N.), established by the United States Navy, is a brass plate, stamped "112.71", with the number "0" cast in the metal and a cross stamped above it, set in the quay wall on the east side of Waterfront Avenue, between First and Second Streets, at the Mare Island Navy Yard. The stamped number "112.71" refers to the elevation of the bench mark above the United States Navy Datum. Elevation: 12.51 feet above mean lower low water.

BENCH MARK 6 (U.S.N.), established by the United States Navy, is a brass plate, stamped "112.59", with the number "6" cast in the metal and with a cross stamped above the number. It is set in the quay wall and located on the east side of Waterfront Avenue between Second and Third Streets. The stamped number "112.59" refers to the elevation of the bench mark above the United States Navy Datum. Elevation: 12.40 feet above mean lower low water.

BENCH MARK 12 (U.S.N.), established by the United States Navy, is a brass plate with the number "12", cast in the metal, with a cross stamped above the number, and stamped "112.64". It is set in the quay wall and located on the east side of Waterfront Avenue between Fourth and Fifth Streets. The stamped number "112.64" refers to the elevation of the bench mark above the United States Navy Datum. Elevation: 12.44 feet above mean lower low water.

BENCH MARK 17 (U.S.N.), established by the United States Navy, is a brass plate, stamped "112.50", with the number "17" cast in the metal and with a cross stamped above the number. It is set in the quay wall and is located on the east side of Waterfront Avenue between Fifth and Sixth Streets. The stamped number "112.50" refers to the elevation of the bench mark above the United States Navy Datum. Elevation: 12.31 feet above mean lower low water.

BENCH MARK 7 Mare 1936 Reset 1942 is a standard disk, stamped "7 Mare 1936 Reset 1942", set in the east wall of Building 121 (Central Power Station) on California Avenue, near the southwest corner of California Avenue and Sixth Street, $87\frac{1}{2}$ feet southeast of the northeast corner of the building and $3\frac{1}{2}$ feet above the pavement. Elevation: 21.22 feet above mean lower low water.

BENCH MARK 398 is the center of a curved arrow cut in the concrete at the lower end of the northern dry dock at Mare Island. The arrow indicates the direction in which to turn the mechanism to open the caisson of the dry dock. It is located near the east end of Ninth Street on the quay wall at the southeast corner of Dry Dock No. 1, 21 feet east and 12 feet south of the caisson and 8 inches west of the face of the wall. The elevation of this bench mark above the United States Navy Datum has been determined as 110.50 feet. Elevation: 10.32 feet above mean lower low water.

TIDAL BENCH MARKS

Mare Island Navy Yard and Vallejo,
Mare Island Strait (cont'd.)

BENCH MARK 4 (1936) is a standard disk, stamped "4 1936", set on top of the concrete water table for the Joiners Building. It is located one mile southeast of the Mare Island Highway Bridge and on the west side of California Avenue and 100 feet south of Tenth Street. It is near the southeast corner of Joiners Building No. 63 (Building No. 118) at the Mare Island Navy Yard. Elevation: 12.72 feet above mean lower low water.

BENCH MARK 5 (1936) is a standard disk, stamped "5 1936", set vertically in a concrete wall. It is located near the southwest corner of Railroad Avenue and Twelfth Street. It is on the north wall of the Shipfitters Building (Building No. 11) (790) near the northeast corner of the building, at the Mare Island Navy Yard. Elevation: 13.89 feet above mean lower low water.

BENCH MARK 6 (1936) is a standard disk, stamped "6 1936", set on top of a concrete pit. It is located near the southeast corner of Railroad Avenue and 20th Street. It is 25 feet east of the entrance gate to the Navy Ammunition Depot, at the Mare Island Navy Yard. Elevation: 17.26 feet above mean lower low water.

BENCH MARK 2 (1878) is a cross in a circle, with the letters "USBM" chiseled on the upper surface of an old stone sea wall. The ground has been filled in on both sides to the level of the top of the sea wall. The bench mark is located at the south end of Mare Island, near Ammunition Depot Pier No. 1, at the Mare Island Navy Yard. It is near the northeast corner of Building No. A-8, 5.6 feet north of a line through the north face of the building and 10.7 feet east of a line through the east face of the building. The bench mark is 24 feet west of the center line of the railroad tracks. The elevation of this bench mark above the United States Navy Datum has been determined as 111.17 feet. Elevation: 10.90 feet above mean lower low water.

The lower low water datum at Mare Island Navy Yard and Vallejo is based on 11 months of automatic tide gage records at Mare Island Navy Yard, November 1, 1936 - September 30, 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	6.00
Mean high water	5.50
Half tide level	3.25
Sea-level datum of 1929 ...	2.83
Mean low water	1.00
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

TIDAL BENCH MARKS

Brazos Drawbridge, Napa River
Lat: 38°12'.6 Long: 122°18'.3

BENCH MARK 1 (1922) is a standard disk set in a tile and imbedded in the ground with the tile projecting about 3 inches above the ground. The bench mark is about 12 yards south of the end of the viaduct approach to the drawbridge, on the levee due west of Brazos station. Elevation: 9.66 feet above mean lower low water.

BENCH MARK 2 (1922) is a standard disk set in the abutment one foot from the north point of the west abutment of the Brazos drawbridge. The bench mark is practically under the end chord of the north side of the bridge and about 300 yards west of Brazos station. Elevation: 10.00 feet above mean lower low water.

BENCH MARK 3 (1922) is the top of the south rail opposite the operating house at the center of the draw. Elevation: 17.43 feet above mean lower low water.

The lower low water datum at Brazos Drawbridge, Napa River is based on 6 high waters and 6 low waters, May 8-11, 1922, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	<u>Feet</u>
Higher high water	7.00
Mean high water	6.50
Half tide level	3.75
Mean low water	1.00
Lower low water datum	0.00
Lowest tide (estimated) ...	-1.5

Napa, Napa River
Lat: 38°17'.9 Long: 122°17'.0

BENCH MARK 2 is a standard United States Geological Survey disk, stamped "20", set vertically in a wall at the northeast corner of the Napa County Courthouse at Second and Brown Streets. The wall faces Brown Street and the bench mark is located one foot south of the cornerstone and 3.7 feet above the walk. Elevation: 24.09 feet above mean lower low water.

BENCH MARK 3 (1937) is a standard disk, stamped "NO 3 1937", set in a concrete slab at the top of a flight of steps leading down to Municipal Wharf, on the west side of Napa River, at the foot of Fourth Street. Elevation: 19.04 feet above mean lower low water.

TIDAL BENCH MARKS

Napa, Napa River (cont'd.)

BENCH MARK 4 (1937) is a standard disk, stamped "NO 4 1937", set in the concrete sidewalk, $\frac{1}{2}$ foot from the south railing at the west end of the Third Street bridge, on the south side of the street, near a vertical bronze tablet at the foot of a light standard. Elevation: 21.94 feet above mean lower low water.

BENCH MARK 5 (1937) is a standard disk, stamped "NO 5 1937", set in the top of a granite basement wall. It is set horizontally one foot from the corner and two feet above the sidewalk, at the Post Office at the southwest corner of Second and Randolph Streets, in the northeast corner of the building. Elevation: 25.42 feet above mean lower low water.

The lower low water datum at Napa, Napa River is based on 3 months of automatic tide gage records, November 1937 - January 1938, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (Feb. 27, 1940) ..	18.6*
Higher high water	7.10
Mean high water	6.60
Half tide level	3.85
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated)	-1.5

*This height resulted from a storm, February 26-27, 1940. The same height was approximated during a flood on February 6, 1942. (Information obtained from "Flood Report, Napa, California", February 6, 1942 which was prepared by the U. S. Weather Bureau.)

Tubbs Island Wharf, Sonoma Creek, San Pablo Bay
Lat: 38°09'. 6 Long: 122°25'. 2

BENCH MARK 1 (1922) is a standard disk, set in a 6-inch tile projecting 6 inches, on the inner slope of a levee and 10 feet from the southeast corner of the most northerly large barn at the second turn from the entrance to Sonoma Creek. The barn is at the northern edge of the group of trees. Elevation: 8.34 feet above mean lower low water.

TIDAL BENCH MARKS

Tubbs Island Wharf, Sonoma Creek,
San Pablo Bay (cont'd.)

BENCH MARK 2 (1922) is a standard disk, set in a 6-inch tile, 18 inches outside of the east fence around the ranch house and 6 feet from the southeast corner of the fence. Elevation: 5.32 feet above mean lower low water.

BENCH MARK 3 (1922) is a standard disk, set in the southeast foundation corner of the fourt^h electric power transmission tower from the high tower on the west bank of Sonoma Creek entrance. Elevation: 6.20 feet above mean lower low water.

The lower low water datum at Tubbs Island Wharf, Sonoma Creek is based on 10 high waters and 10 low waters, February 1-28, 1922, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	6.50
Mean high water	5.90
Half tide level	3.50
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

Sonoma Creek Entrance (Sears Point Tol^l Road),
San Pablo Bay
Lat: 38°09'.4 Long: 122°24'.4

BENCH MARK 1 (1931) is a standard disk (not stamped) set in the concrete base supporting Sonoma Creek drawbridge. It is about 5 feet from the northwest corner and one foot from the west side of the foundation. It is on the Sears Point toll road at the western toll station. Elevation: 9.56 feet above mean lower low water.

BENCH MARK 2 (1931) is a standard disk (not stamped) set in the top surface of the center of the south side of the concrete support for Sonoma Creek drawbridge. It is about 15 feet south of Bench Mark 1. Elevation: 9.56 feet above mean lower low water.

BENCH MARK 3 (1931) is a standard disk (not stamped) set in the outer corner of the northeast footing of the power line tower on the west bank of Sonoma Creek and about 50 yards south of the west end of the bridge. Elevation: 8.39 feet above mean lower low water.

TIDAL BENCH MARKS

Sonoma Creek Entrance (Sears Point Toll Road),
 San Pablo Bay (cont'd.)

The lower low water datum at Sonoma Creek Entrance is based on 3 months of automatic tide gage records, May-July, 1930, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.0
Higher high water	6.00
Mean high water	5.50
Half tide level	3.25
Mean low water	1.00
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

Petaluma Creek Entrance (Northwestern Pacific Railroad Bridge),
 San Pablo Bay

Lat: 38°06' 8 Long: 122°30' 0

BENCH MARK 7 (1921) is the outer and upper part of a bolt on the northernmost center pile of the middle cluster on the southern extremity of the falsework on which the bridge swings. A triangle of nails surrounds it. It is about the same elevation as the central stringer. Elevation: 9.77 feet above mean lower low water.

BENCH MARK 8 (1921) is a standard disk set in the easternmost concrete pier on the south side of the drawbridge. Elevation: 9.11 feet above mean lower low water.

BENCH MARK 9 (1921) is a standard disk set in the westernmost concrete pier on the south side of the drawbridge. Elevation: 9.29 feet above mean lower low water.

BENCH MARK 10 (1921) is the upper part of the end of a bolt projecting from the face of a wooden bulkhead at the end of a fill on the west side of the creek and on the north side of the track. A triangle of nails surrounds it. Elevation: 12.29 feet above mean lower low water. Note: This bench mark has apparently settled; the difference in elevation between leveling of 1921 and 1930 being about two-thirds of a foot. The elevation given above is based on the 1930 leveling

TIDAL BENCH MARKS

Petaluma Creek Entrance
(Northwestern Pacific Railroad Bridge),
San Pablo Bay (cont'd.)

The lower low water datum at Petaluma Creek Entrance is based on 4 months of automatic tide gage records, June - September 1930, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	6.10
Mean high water	5.50
Half tide level	3.25
Sea-level datum of 1929 ...	2.95
Mean low water	1.00
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

Lakeville, Petaluma Creek, San Pablo Bay
Lat: 38°11'.9 Long: 122°32'.8

BENCH MARK 1 (1922) is a standard disk, stamped "No. 1", set in a 6-inch tile filled with concrete, extending 8 inches above the ground (in 1922). It is 115 feet east and 125 feet north of the east end of the Lakeville dock and is on the north end of a small knoll. Elevation: 21.72 feet above mean lower low water.

BENCH MARK 2 (1922) is a standard disk, stamped "No. 2", set in a 6-inch tile filled with concrete, extending 3 inches above the ground (in 1922). It is $6\frac{1}{2}$ feet west of the northeast corner of a barn south of the Lakeville dock and one foot north of the north side of the barn. Elevation: 15.18 feet above mean lower low water.

BENCH MARK 3 (1922) is a standard disk, stamped "No. 3 1922", set in a 6-inch tile filled with concrete and located in the southwest fence corner, about 2 feet from each fence line and 10 feet south of the south gatepost of gate opening to driveway leading to the residence of C. H. Bodwell. Elevation: 11.89 feet above mean lower low water.

The lower low water datum at Lakeville, Petaluma Creek is based on 3 months of automatic tide gage records, July - September 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

TIDAL BENCH MARKS

Lakeville, Petaluma Creek,
San Pablo Bay (cont'd.)

	Feet
Higher high water	6.40
Mean high water	5.90
Half tide level	3.45
Mean low water	1.00
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

Upper or Quarry Drawbridge, Petaluma Creek
San Pablo Bay
Lat: 38°13'. 7 Long: 122°36'. 8

BENCH MARK 1 (1922) is a standard disk, stamped "1922 No. 1", set in a 6-inch tile filled with concrete, located 13 feet west of the west rail of the main track of the Northwestern Pacific Railroad, 108 feet north of the north end of crushed stone bins, 39 feet east of the eastern edge of the concrete highway and about 295 yards south of the drawbridge. Elevation: 13.65 feet above mean lower low water.

BENCH MARK 2 Reset (1940) is a standard disk, stamped "No. 2 1922 Reset 1940", set in the corner of a concrete drop inlet box, about 2/3 mil east of the east city limits of Petaluma along the Petaluma-San Rafael Highway (Route 1-C), 467 feet, N65°W (magnetic) from the northeast bolt on the concrete base of a railway semaphore signal tower and 246 feet, S13°W (magnetic) from the south end of the truss of a railroad bridge across Petaluma Creek. Elevation: 28.33 feet above mean lower low water.

BENCH MARK 3 (1922) is a standard disk, stamped "1922 No. 3", set in a 6-inch tile filled with concrete, located 230 feet south of the south end of the drawbridge, 18 feet east of the east rail of the main line of the Northwestern Pacific Railroad, 10 feet north of the first switch point south of the drawbridge and 3 feet west of the right-of-way fence. Note: This bench mark should be used with caution as it has evidently settled about 0.3 foot between the time of its establishment in 1922 and leveling in 1937. Elevation: 11.80 feet above mean lower low water.

BENCH MARK 4 (1922) is a cross cut in the top of a 6-inch square concrete highway post located 13 feet west of the west edge of a concrete highway, 39 feet north of a telephone pole marked "36/25", and 66 feet west of Bench Mark 1. Elevation: 23.49 feet above mean lower low water.

TIDAL BENCH MARKS

Upper or Quarry Drawbridge,
Petaluma Creek, San Pablo Bay (cont'd.)

BENCH MARK 5 (1922) is a square cut in the top of a 6-inch square concrete highway post which is set by the north gate post of gate between two barns at a distance of 16 feet west of the western edge of the concrete highway and 85 feet north of a telephone pole marked "36/23". Elevation: 19.26 feet above mean lower low water.

BENCH MARK RV 199 (N.W.P.R.R.) is a standard monel metal rivet, set in the concrete foundation of the semaphore signal south of the drawbridge, 10 feet east of the main track, about 1.5 miles southeast along the Northwestern Pacific Railroad from the station at Petaluma, Sonoma County. Elevation: 13.99 feet above mean lower low water.

BENCH MARK RV 198 (N.W.P.R.R.) is a standard monel metal rivet, set in the concrete foundation of the semaphore signal north of the drawbridge, 1.1 miles southeast along the Northwestern Pacific Railroad from the station at Petaluma, Sonoma County and 10 feet west of the main track. Elevation: 13.20 feet above mean lower low water.

The lower low water datum at Upper or Quarry Drawbridge, Petaluma Creek is based on 3 months of automatic tide gage records, July - September 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Higher high water	6.60
Mean high water	6.10
Half tide level	3.55
Sea-level datum of 1929 ...	3.23
Mean low water	1.00
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.0

McNear Landing, San Pablo Bay
Lat: 37°59'.3 Long: 122°26'.8

BENCH MARK 4 (1921) is a standard disk, unstamped, set in a horizontal drill hole in an outcropping rock on the face of a cliff on the west side of the paved road to the Daniel Contracting Company quarry and located 33 feet west of the gate at the entrance to McNear Beach. Elevation: 19.31 feet above mean lower low water.

TIDAL BENCH MARKS

McNear Landing,
San Pablo Bay (cont'd.)

BENCH MARK 6 (1937) is a standard disk, stamped "No. 6 1937", set in concrete and located on the property of the Daniel Contracting Company. It is about 197 feet inshore from the quarry dock, in the concrete base of a timber strut on the northwest side of a stone crusher, at the southeast end of a long belt conveyor and on the southwest side of the pit in which the belt conveyor runs. Elevation: 19.47 feet above mean lower low water.

BENCH MARK 7 (1937) is a standard disk, stamped "No. 7 1937", set in concrete and located on the property of the Daniel Contracting Company. It is about 197 feet inshore from the quarry dock, in the concrete base of a small shed on the northwest side of the road leading inshore from the dock. It is about 98 feet northwest of Bench Mark 6. Elevation: 19.81 feet above mean lower low water.

BENCH MARK 8 (1937) is a standard disk, stamped "No. 8 1937", set in concrete and located on the property of the Daniel Contracting Company. It is on the top of a retaining wall over a belt conveyor leading from under the rock pile to the quarry dock and 33 feet from the high water line. Elevation: 15.15 feet above mean lower low water.

BENCH MARK 9 (1937) is a standard disk, stamped "No. 9 1937", set in concrete on the property of the Daniel Contracting Company. It is at the entrance to a tunnel leading under the rock pile from the northwest. It is 10 feet from the track approaching the dock from the west and about 82 feet from the inshore end of the trestle leading onto the dock. Elevation: 23.05 feet above mean lower low water.

The lower low water datum at McNear Landing is based on 92 high waters and 92 low waters, October 1 - November 17, 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	5.70
Mean high water	5.20
Half tide level	3.15
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

TIDAL BENCH MARKS

Point San Quentin and VicinityLat: 37°56'. 6 Long: 122°28'. 5

BENCH MARK 1 (1916) is a standard disk set in sandstone bedrock at the southeast side of the head of the wharf and bears S50°W (magnetic) 394 feet from a pile at the southeast side of the Point San Quentin ferry slip. Elevation: 11.57 feet above mean lower low water.

BENCH MARK 2 (1916) is a standard disk set in a yellow sandstone outcrop just above the high water mark to the northwest of the head of the wharf and bears N80°W (magnetic) 98 feet from Bench Mark 1. Bench Mark 2 is approximately on line with Bench Marks 1 and 3. Elevation: 6.59 feet above mean lower low water.

BENCH MARK 3 (1916) is a standard disk, stamped "3 1917", set in a dark, hard, gray sandstone outcrop, about 25 feet north of a larger ledge of yellow sandstone and about 400 feet north of the junction of the highway leading to San Rafael, San Quentin and the causeway leading east to Point San Quentin ferry slip. The disk is near the water's edge, about 50 feet east of the San Rafael highway and about 200 feet south of a road leading east to a private wharf. Elevation: 4.78 feet above mean lower low water.

BENCH MARK 4 (1936) is a standard disk, stamped "4 1936", set in bedrock at Point San Quentin on a rocky knoll at the eastern extremity of the point. The bench mark is located at the west end of the knoll and on the south side of the Richmond Ferry Highway. The bench mark is 21 yards south of a water tower, 25 feet east of the east end of a highway guard rail and located in a niche about three feet above the level of the road. Elevation: 18.58 feet above mean lower low water.

BENCH MARK 5 (1936) is a standard disk, stamped "5 1936", set in the concrete pier south of San Quentin pumping station No. 2, about 5 feet south of the pump building, about 100 feet east of the highway intersection and on the south shore of the point. Elevation: 7.81 feet above mean lower low water.

BENCH MARK 6 (1936) is a standard disk, stamped "6 1936", set in the massive concrete eastern post of a pair of posts near the south entrance of the Post Office Building. The bench mark is located at San Quentin, near the entrance gates to San Quentin Prison. Elevation: 35.09 feet above mean lower low water.

TIDAL BENCH MARKS

Point San Quentin
and Vicinity (cont'd.)

BENCH MARK 7 (1936) is a standard disk, stamped "7 1936", set on the concrete foundation of the west gate post of a gateway to the San Quentin Prison property, located about $\frac{1}{2}$ mile northwest of San Quentin, on the south side of the Richmond Ferry Highway and on the property of the San Quentin Prison. Elevation: 24.13 feet above mean lower low water.

BENCH MARK "C" is a metal disk 4 inches in diameter, with "△ STA" cast in it. The bench mark is imbedded in a mass of concrete and is stamped "C". It is located at Point San Quentin on the south road to San Quentin Prison, about 40 yards west of the San Quentin Pumping Station No. 2. The bench mark is in the road-bed at the point of tangency between the highway curving around Point San Quentin and the straight highway to the San Quentin Gates. Elevation: 26.74 feet above mean lower low water.

BENCH MARK "D" is a metal disk 4 inches in diameter, with "△ STA" cast in it. It is stamped "D" and is imbedded in a mass of concrete at Point San Quentin, in the Richmond Ferry Highway road-bed and 69 yards west of the rocky knoll at the east end of the point. The bench mark is located on the south side of the road. Elevation: 11.55 feet above mean lower low water.

BENCH MARK "X", established by the State of California authorities, is a metal disk about $3\frac{1}{2}$ inches in diameter with the following letters cast in the metal: "State of California-Department of Public Works-Division of Architecture-Bench Mark." The bench mark is set on top of a large concrete post which extends about 3 feet above the ground. It is located about $\frac{1}{2}$ mile northwest of San Quentin, and about 150 feet south of the Richmond Ferry Highway, on the property of the San Quentin Prison. It is located in a field about 260 feet southwest of a gateway in the San Quentin Prison fence line. Elevation: 13.42 feet above mean lower low water.

BENCH MARK "Y", established by State of California authorities, is a metal disk about $3\frac{1}{2}$ inches in diameter, with the following letters cast in the metal: "State of California-Department of Public Works-Division of Architecture-Bench Mark", set on top of a large concrete post, extending about 3 feet above the ground to the level of the roadway. The bench mark is located on the south side of the road about $\frac{1}{2}$ mile northwest of San Quentin on the Richmond Ferry Highway (Marin County Road No. 69-A). Elevation: 13.12 feet above mean lower low water.

TIDAL BENCH MARKS

Point San Quentin
and Vicinity (cont'd.)

BENCH MARK 8 (1936) is a standard disk, stamped "8 1936", set on top of a concrete culvert which is marked "0.65 mile (126-00) 1929". The bench mark is located on the north side of the Richmond Ferry Highway (Marin County Road No. 69-A), 3 miles southeast of San Rafael. It is near the junction of the highway with the road to Greenbrae. Elevation: 10.06 feet above mean lower low water.

BENCH MARK 9 (1936) is a standard disk, stamped "9 1936", set on top of a concrete culvert and tide gate. The culvert is marked "1.15 miles (99-80) 1929". The bench mark is located on the north side of the Richmond Ferry Highway (Marin County Road No. 69-A), 2.5 miles southeast of San Rafael. Elevation: 8.54 feet above mean lower low water.

BENCH MARK 10 (1936) is a standard disk, stamped "10 1936", set in a concrete block on the north side of the Richmond Ferry Highway (Marin County Road No. 69-A), at the base of the south leg of a steel tower which supports power cables. The bench mark is located about 2 miles southeast of San Rafael. Elevation: 6.40 feet above mean lower low water.

BENCH MARK 11 (1936) is a standard disk, stamped "11 1936", set on the east wing of a culvert which is marked "2.30 miles (41-6) 1929". The bench mark is located on the south side of the Richmond Ferry Highway, 1.0 mile southeast of San Rafael, at the junction of United States Highway No. 101 and the Richmond Ferry Highway (Marin County Road No. 69-A). Elevation: 6.65 feet above mean lower low water.

BENCH MARK 12 (1936) is a standard disk, stamped "12 1936", set on top of a concrete culvert and tide gate which is marked "2.57 miles (24-11) 1929". The bench mark is located on the north side of Highway No. 101, 0.6 mile southeast of San Rafael. Elevation: 8.65 feet above mean lower low water.

BENCH MARK B 35 (U.S.G.S.) at San Rafael, is a United States Geological Survey standard disk, stamped "8.629 B 35 1930", set in the curb of the platform around the station and 2 feet west of an "L" curve in the curb. The bench mark is located 4 feet south of the Northwestern Pacific Railroad station and 18 feet west of the main track. Elevation: 11.40 feet above mean lower low water.

TIDAL BENCH MARKS

Point San Quentin
and Vicinity (cont'd.)

BENCH MARK Y 107 (1932) at San Rafael, is a standard disk, stamped "11.558 Y 107 1932", set vertically in the ninth concrete pillar north of the south side of the Marin County Milk Company building, in the west face of the building, 4 feet above the walk. The bench mark is located east across the tracks from the Northwestern Pacific Railroad station. Elevation: 14.33 feet above mean lower low water.

BENCH MARK Z 107 (1932) at San Rafael, is a standard disk, stamped "26.962 Z 107 1932", set vertically in the south face of the west railing of the steps of the county courthouse, at the south entrance of the building and 2 feet higher than the walk. Elevation: 29.73 feet above mean lower low water.

The lower low water datum at Point San Quentin and Vicinity is based on one year of automatic tide gage records at Point San Quentin, October 1936 - September 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	<u>8.5</u>
Higher high water	5.70
Mean high water	5.10
Half tide level	3.10
Sea-level datum of 1929 ...	2.77
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Vicinity of El Campo
Lat: 37°54'. 0 Long: 122°28'. 0

BENCH MARK 1 (1895) is the head of a nail driven into the center of a lead plug in a hole in the center of a 7-inch circle cut in the top of the highest point of the rock ledge on the north side of the point of land about $\frac{3}{4}$ mile southeast by south from California Point. Bearings and distances are as follows: Highest point of Red Rock, North-northeast $\frac{3}{4}$ mile East, distance $2\frac{3}{8}$ miles; California Point, Northwest by North, distant $\frac{3}{4}$ mile. Elevation: 5.89 feet above mean lower low water.

TIDAL BENCH MARKS

Vicinity of El Camoo (cont'd.)

The lower low water datum in the vicinity of El Campo is based on 12 high waters and 17 low waters, October 4-25, 1895 and April 6 - July 26, 1897, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.0
Higher high water	5.72
Mean high water	5.10
Half tide level	3.15
Mean low water	1.20
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

California City

Lat: 37°53'. 5 Long: 122°26'. 6

BENCH MARK "Brass Disk" is a brass disk or plate, located at the inner end of the L-shaped dock, imbedded in the top of the concrete sea wall one foot from the northwest face of the dock. It is stamped as follows: "A U.S.C.&G. SURVEY BENCH MARK LOCATED N 17°38'W TRUE 3 CH. 21.56L. ELEV. 5.64 FT BELOW THIS PLATE." It is located on the grounds of the California Nautical School. Elevation: 13.14 feet above mean lower low water.

BENCH MARK 8 (1937) is a standard disk, stamped "8 1937", set on the west corner of the westerly (unused) of two concrete cable sheave anchors, on the grounds of the California Nautical School. It is 137 feet west-southwest of the inner end of the L-shaped dock, 24 feet from the southeast face of the electric shop (building 21), and 94.6 feet east of the end of a crane track. Elevation: 16.99 feet above mean lower low water.

BENCH MARK 9 (1937) is a standard disk, stamped "9 1937", set on the southeast corner of the concrete sea wall and 700 feet from the inner end of the L-shaped dock. It is located on the grounds of the California Nautical School. Elevation: 11.03 feet above mean lower low water.

BENCH MARK 10 (1937) is a standard disk, stamped "10 1937", set on a low, narrow concrete shelf on the northeast side of the gantry crane track support, $58\frac{1}{2}$ feet from the north end of the support. It is 139 feet south-southwest from Bench Mark 8, 83 feet from the northwest face of the dock (projected) and is located on the grounds of the California Nautical School. Elevation: 16.14 feet above mean lower low water.

TIDAL BENCH MARKS

California City (cont'd.)

The lower low water datum at California City is based on 5 months of automatic tide gage records, May - September 1930, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	<u>Feet</u>
Highest tide (estimated) ..	8.5
Higher high water	5.70
Mean high water	5.10
Half tide level	3.10
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Angel Island (West Garrison)
Lat: 37°51'.6 Long: 122°26'.6

BENCH MARK 10 (1936) is a standard disk, stamped "10 1936", set in the northwest corner of the concrete foundation of the base of a cannon, the north cannon of a group of three cannons near the sea wall at Fort McDowell. Elevation: 12.11 feet above mean lower low water.

BENCH MARK 11 (1936) is a standard disk, stamped "11 1936", set in the northeast corner of the concrete roof of the vault for the shore end of submarine cables. The bench mark is located at Fort McDowell near the south end of the sea wall. A "Cable Crossing" sign is on the sea side of the vault. Elevation: 19.64 feet above mean lower low water.

BENCH MARK 12 Reset (1940) is a standard disk, stamped "BM 12 1936 Reset 1940", set horizontally in the concrete retaining wall which lies along the northerly edge of the brick gutter, 9 feet north of the north road around the parkway leading toward the dock, directly across the parkway from the residence nearest the shore line and about 150 yards (paced) from the inshore point of the dock. Elevation: 44.21 feet above mean lower low water.

BENCH MARK 13 Reset (1940) is a standard disk, stamped "BM 13 1936 Reset 1940", set in a boulder similar to the bedrock, 66 feet in front of the duplex residence Numbers 48 and 49 in the parkway, about 36 feet from the center line of the road in front of the residence and about 200 yards from the inshore point of the dock. Elevation: 67.77 feet above mean lower low water.

TIDAL BENCH MARKS

Angle Island
(West Garrison) (cont'd.)

The lower low water datum at Angel Island (West Garrison) is based on 7 months of automatic tide gage records, February - November 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	<u>Feet.</u>
Highest tide (estimated) ..	8.5
Higher high water	5.60
Mean high water	5.00
Half tide level	3.05
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Angel Island (East Garrison)
Lat: 37°51'. 8 Long: 122°25'. 2

BENCH MARK 4 (1936) is a standard disk, stamped "4 1936", set horizontally on top of the northwest end of a sea wall and at the southeast corner of the dock. The bench mark is located on the east shore of Angel Island, at the East Garrison Wharf, about 500 feet northwest of Quarry Point. Elevation: 12.89 feet above mean lower low water.

BENCH MARK 5 (1936) is a standard disk, stamped "5 1936", set in the corner of a concrete gasoline well alongside the road near the east shore of Angel Island, about 200 feet northwest of Quarry Point on the northwest side of the road leading from the quartermaster's garage to the southeast end of a parade ground. The bench mark is about 30 feet southeast of the southeast corner of the gas and oil warehouse (Building 142). Elevation: 35.66 feet above mean lower low water.

BENCH MARK 6 (1936) is a standard disk, stamped "6 1936", set in the concrete base of a flagpole on the northeast side of the guard-house (Building 20) at East Garrison, about 400 feet west of Quarry Point. Elevation: 50.16 feet above mean lower low water.

BENCH MARK 7 (1936) is a standard disk, stamped "7 1936", set on top of a retaining wall alongside the steps, near the southwest face of the mess hall, on the south side of the main entrance to the building. The bench mark is located at East Garrison, about 700 feet west of Quarry Point. Elevation: 72.08 feet above mean lower low water.

TIDAL BENCH MARKS

Angel Island
 (East Garrison) (cont'd.)

Lower low water datum at Angel Island (East Garrison) is based on 10 months of automatic tide gage records, December 1936 - December 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	5.70
Mean high water	5.10
Half tide level	3.10
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-0.5

Sausalito and Vicinity
Lat: 37°51' Long: 122°29'

BENCH MARK "SAUSALITO No. 1" (1917) is a standard disk, stamped "SAUSALITO No. 1 1917", set in the top of a concrete post, projecting about 6 inches above the ground, located about 0.4 mile north of the Northwestern Pacific Railroad station, about 30 feet north of the prolongation of the center line of Pine Street, about 80 feet south of semaphore signal No. 70, and 21 feet east of the northbound track. Elevation: 9.99 feet above mean lower low water.

BENCH MARK "SAUSALITO No. 2", (1917) is a standard disk, stamped "SAUSALITO No. 2 1917", set vertically in the north wall of a small brick building, about one foot above the sidewalk on Pine Street. The bench mark is at the southeast corner of the intersection of Pine and Caledonia Streets. Elevation: 16.56 feet above mean lower low water.

BENCH MARK "SAUSALITO No. 3", (1917) is a standard disk, stamped "SAUSALITO No. 3 1917", set vertically in the concrete wall of the foundation of a large frame building, about one foot above the sidewalk on Pine Street. The bench mark is located at the northwest corner of the intersection of Pine and Caledonia Streets. Elevation: 17.89 feet above mean lower low water.

BENCH MARK 2 (1877) is the rounded head of a copper bolt firmly set in a rock along shore about one mile south of Sausalito Point just above the high water mark and about 100 feet south of a wharf. Elevation: 7.33 feet above mean lower low water.

TIDAL BENCH MARKS

Sausalito and Vicinity (cont'd.)

BENCH MARK 5 (1906) is the bottom of a hinge socket, the lowest of three hinge sockets, on the east side of the door on the north side of the brick magazine on the Government reservation. Elevation: 33.95 feet above mean lower low water.

BENCH MARK 6 (1906) is the bottom of a hinge socket, the lowest of three hinge sockets, on the west side of the door on the north side of the brick magazine on the reservation. Elevation: 33.95 feet above mean lower low water.

BENCH MARK 27 (1925) is a standard disk, stamped "B.M. 27 1925", located on the first rocky point about 150 feet north of the shore end of the old Water Dock on the Fort Baker Reservation. The bench mark is in the black rocks along the shore, about 5 feet above high water and about 6 feet out from the cliff. Elevation: 10.25 feet above mean lower low water.

BENCH MARK 24 (1925) is a standard disk, stamped "B.M. 24 1925", set in the top of a concrete post, from which a 5/8-inch iron rod projects upward about 2 feet. The bench mark is located about 1.1 miles south of the Northwestern Pacific Railroad station at Sausalito, about 83 feet west of the path from the old Water Dock on the Fort Baker Reservation. The bench mark is about 25 feet southwest of the sea cliff and about 7 feet southeast of a large three-forked scrub oak tree. Elevation: 47.15 feet above mean lower low water.

BENCH MARK 25 (1925) is a standard disk, stamped "B.M. 25 1925", set in the top of a concrete post, projecting about 6 inches above ground and located about 1.1 miles south of the Northwestern Pacific Railroad station at Sausalito, about 1,300 feet south of the Fort Baker-Sausalito Gate, 18 feet northeast of the road, about 10 feet lower than the road and in an old roadway leading to the beach. Elevation: 101.38 feet above mean lower low water.

BENCH MARK 26 (1925) is a standard disk, stamped "B.M. 26 1925", set in the center of the west wall of a brick culvert about one mile south of the Northwestern Pacific Railroad station at Sausalito, about 825 feet south of the Fort Baker-Sausalito Gate, about 7 feet west of the road and 2 feet lower than the road. Elevation: 106.56 feet above mean lower low water.

BENCH MARK 27 (1925) is a standard disk, stamped "B.M. 27 1925", set in the top of a concrete post, projecting about 4 inches above the ground, located about one mile south of the Northwestern Pacific Railroad station at Sausalito, about 775 feet south of the Fort Baker-Sausalito Gate, about 8 feet west of the road, one foot inside the fence line and one foot higher than the road. Elevation: 109.97 feet above mean lower low water.

TIDAL BENCH MARKS

Sausalito and Vicinity (cont'd.)

BENCH MARK 28 (1925) is a standard disk, stamped "B.M. 28 1925", set in the top of a concrete post, projecting about 6 inches above ground, located about one mile south of the Northwestern Pacific Railroad Station at Sausalito, about 475 feet south of the Fort Baker-Sausalito Gate, 14 feet east of the road and about 4 feet lower than the road. Elevation: 106.71 feet above mean lower low water.

BENCH MARK 29 (1936) is a standard disk, stamped "29 1936", set vertically in the north face of a massive concrete pylon, about one foot above the street level at 530 Water Street in Sausalito. The bench mark is located at the northeast corner of a concrete retaining wall, surrounding the old Hearst Estate. Elevation: 11.47 feet above mean lower low water.

BENCH MARK 30 (1936) is a standard disk, stamped "30 1936", set in concrete, located in a public park, at the base of a stone ornamental elephant on the east side of Water Street in Sausalito, 27 yards northwest of El Potal Street. The bench mark is in the northwest one of a pair of elephants. Elevation: 16.21 feet above mean lower low water.

BENCH MARK 11 (1906) is a $2\frac{1}{2}$ -inch chiseled triangle, partly covered by a post supporting a hand rail. The bench mark is located at Fort Baker, at the south side of the guardhouse, on the west end of the granite step at the bottom of the wooden stairs. Elevation: 18.30 feet above mean lower low water.

BENCH MARK 13 (1906) is a chiseled cross on the southwest end of the granite sill of the northwest door of the old pumping station located at Fort Baker on the road leading to Lime Point from the barracks. Elevation: 12.37 feet above mean lower low water.

BENCH MARK 14 (1906) is a chiseled triangle within a 4-inch chiseled circle, located at Fort Baker, about 0.3 mile south toward Lime Point Lighthouse from the barracks, on the granite abutment of the land end of the Government Wharf. Elevation: 12.79 feet above mean lower low water.

BENCH MARK 15 (1906) is a chiseled cross at the base and north end of a flight of steps to the quarters of the lighthouse at Lime Point, about 175 feet east of the north bridge pier of the Golden Gate Bridge, 9 inches from the east edge of the concrete step and about 8 inches below the gravel walk level. Elevation: 20.59 feet above mean lower low water.

TIDAL BENCH MARKS

Sausalito and Vicinity (cont'd.)

BENCH MARK 16 (1906) is a chiseled triangle at the top of the flight of steps leading south to the quarters of the lighthouse at Lime Point, near the northeast corner of a concrete walk and near an iron railing. The bench mark is about 180 feet east of the north bridge pier of the Golden Gate Bridge and 20 feet south of Bench Mark 15. Elevation: 23.44 feet above mean lower low water.

BENCH MARK 17 (1906) is the top of a $\frac{1}{4}$ -inch brass bolt imbedded on the highest point of rock 180 feet east of the north bridge pier of the Golden Gate Bridge at Lime Point, about 40 feet north of the quarters of the lighthouse, $1\frac{1}{2}$ feet west of the concrete walk leading to the quarters and $1\frac{1}{2}$ feet north of a water tank. Elevation: 31.48 feet above mean lower low water.

BENCH MARK 21 (1917) is a standard disk, stamped "B.M. 21", set in the concrete top of the rubble sea wall just north of the wharf abutment, located at Lime Point, about 0.1 mile south of the south end of the entrance to the Government Wharf. (In April 1934 it was reported that the bench mark had been filled around during construction of the Golden Gate bridge to a depth of 19 inches.) Elevation: 10.76 feet above mean lower low water.

The lower low water datum at Sausalito and Vicinity is based on one year of automatic tide gage records at Sausalito, October 1936 - September 1937, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	5.50
Mean high water	4.90
Half tide level	3.00
Sea-level datum of 1929 ...	2.90
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Point Diablo, Golden Gate
Lat: 37°49'.2 Long: 122°30'.0

BENCH MARK 1 (1895) is a cross chipped into the vertical face of the rock wall on the south side of a small cleft in the shore, 656 feet northwest by north (magnetic) from the eastern tip of Diablo Point. Elevation: 10.48 feet above mean lower low water.

TIDAL BENCH MARKS

Point Diablo,
Golden Gate (cont'd.)

The lower low water datum at Point Diablo is based on 13 high waters and 8 low waters, September 24 - November 20, 1895, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	5.60
Mean high water	5.00
Half tide level	3.05
Mean low water	1.10
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

Point Bonita, Golden Gate
Lat: 37°49'.1 Long: 122°31'.7

BENCH MARK Bonita 2 (1917) is a standard disk, stamped "Bonita B.M. 2 1917", set in the rock shore near the high water line and 43 feet west of the center line of the section of the wharf in front of the Coast Guard boathouse. Elevation: 11.32 feet above mean lower low water.

BENCH MARK 2a (1925) is a standard disk, unstamped, set in the top of a large red and green rock on the beach about 10 feet from the base of the bluff and 174 feet west from the center line of the section of the wharf immediately in front of the Coast Guard boat-house. Elevation: 15.83 feet above mean lower low water.

BENCH MARK Bonita 3 (1917) is a standard disk, stamped "Bonita B.M. 3 1917", set in the rock shore near the high water line and 56 feet east of the center line of the section of wharf immediately in front of the Coast Guard boathouse. Elevation: 9.75 feet above mean lower low water.

The lower low water datum at Point Bonita, Golden Gate is based on 4 months of automatic tide gage records, February - May 1935, reduced to mean values. The elevations of other tide planes referred to this datum are as follows:

	Feet
Highest tide (estimated) ..	8.5
Higher high water	5.80
Mean high water	5.20
Half tide level	3.20
Mean low water	1.20
Lower low water datum	0.00
Lowest tide (estimated) ...	-2.5

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Tidal bench marks San Francisco Bay rag



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